TECHNICAL PROCEDURES
VOLUME FIVE

P/N: 072-0062

Copyright 1983 by Apple Computer, Inc.

Revision: June, 1987

Apple Technical Procedures

Volume Five

Table of Contents

	--Title page (contains build date)	-
Disk II	--Table of Contents	02/87
	--Take-Apart	02/87
	--Troubleshooting	02/87
	--Adjustments	02/87
	--Preventive Maintenance	02/87
	--Illustrated Parts List	02/87
	(except pages 5.4, 5.5)	06/87
Disk ///	--Table of Contents	02/87
	--Take-Apart	02/87
	--Troubleshooting	02/87
	--Adjustments	02/87
	--Preventive Maintenance	02/87
	--Illustrated Parts List	02/87
	(except pages 5.2, 5.3)	06/87
ProFile	--Table of Contents	03/86
	--Data Recovery	06/85
	--Troubleshooting & Exchange Procedures	03/86
	--Illustrated Parts List	02/86
	(except page 3.9)	10/86
	--Appendix	03/86
DuoDisk	--Table of Contents	02/87
	--Basics	02/87
	--Take-Apart	02/87
	--Adjustments	02/87
	--Troubleshooting	02/87
	--Preventive Maintenance	02/87
	--Illustrated Parts List	02/87
	(except pages 6.2, 6.3)	06/87
	--Additional Procedures	02/87
Disk IIc (IIc External Drive)	--Table of Contents	10/86
	--Take-Apart	10/86
	--Adjustments	02/87
	--Preventive Maintenance	02/87
	--Illustrated Parts List	04/87

UniDisk 3.5	--Table of Contents	06/86
	--Service Notes	06/86
	--Basics	10/85
	(except page 1.1)	02/87
	--Diagnostics	10/85
	--Troubleshooting	10/85
	(except pages 3.3, 3.4)	08/86
	--Take-Apart	10/85
	(except pages 4.6, 4.8)	12/85
	--Illustrated Parts List	10/86
	(except pages 5.2, 5.3)	02/87
Apple 5.25 Drive / UniDisk	--Table of Contents	02/87
	--Basics	10/86
	--Take-Apart	02/87
	--Adjustments	02/87
	--Troubleshooting	02/87
	--Preventive Maintenance	02/87
	--Illustrated Parts List	02/87
	(except page 6.3)	06/87

Disk II

Apple Technical Procedures

Disk II

Technical Procedures

❑ TABLE OF CONTENTS

Section 1 – Take-Apart	1.3	Cover
	1.4	Disk Drive Cable
	1.4	Analog Card
Section 2 – Troubleshooting	2.2	Introduction
	2.2	General Information
	2.2	How to Use the Symptom Chart
	2.3	Symptom Chart
	2.4	Analog Card Troubleshooting
	2.4	Materials Required
	2.4	System Setup
	2.4	Visual Inspection
	2.5	Symptoms
	2.5	System Will Not Boot
	2.6	Drive Will Not Read or Write
	2.7	Drive Has Trouble Reading
	2.7	Drive Has Trouble Writing
	2.8	Write-Protect Circuit Malfunctions
Section 3 – Adjustments	3.2	Introduction
	3.3	DSPEED
	3.4	Write Protect Switch
Section 4 – Preventive Maintenance	4.2	Introduction
	4.2	Read/Write Head
	4.3	Head Load Button
	4.4	Motor Drive Belt
Section 5 – Illustrated Parts List	5.3	Finished Goods Assembly (Figure 1)
	5.5	Internal Parts (Figure 2)
	5.7	ICs (Figure 3)

©Apple Computer, Inc., 1982, 1984, 1985, 1986, and 1987. No portion of this document may be reproduced in any form without the written permission of Apple Computer, Inc.

Apple IIGS is a trademark of Apple Computer, Inc. Disk II, Apple, and the Apple logo are registered trademarks of Apple Computer, Inc.

Apple Technical Procedures

Disk II

Section 1 – Take-Apart

❑ CONTENTS

1.3 Cover
1.4 Disk Drive Cable
1.4 Analog Card

Note: If a step is underlined, detailed instructions for that step can be found elsewhere in this section.

❑ COVER

Materials Required

#2 Phillips screwdriver

Remove

1. Turn the drive upside down and remove the four Phillips screws.
2. Set the door end of the unit down on a protective pad.
3. Slide the cover up until it clears the interior parts of the drive. Set the cover aside and set the unit down on its base again.

 Note: If the vent covers (inside the housing) get caught on the frame while you are removing the cover, gently pry them away from the frame while continuing removal. After removal, smooth out any tear or bubble in the covers.

Replace

1. Set the door end of the unit down on a protective pad.
2. Slide the cover down over the drive.
3. Turn the drive upside down and replace the four screws.

❑ DISK DRIVE CABLE

Materials Required

#2 Phillips screwdriver

Remove

1. Remove the cover.
2. Release the catch on the nylon cable holder (mounted on the inside of the back plate) by pressing the tab toward the back of the unit.
3. Disconnect the cable from the analog card and lift the cable free of the drive.

Replace

1. Place the cable into the nylon cable holder so that the toroids (donut-shaped ferrite pieces) are just below the cable holder, and snap the holder shut.
2. Attach the ribbon cable plug to the connector on the analog card, making sure that both rows of pins align with the holes in the plug and that the arrow on the plug points to pin 1 on the connector. (The cable should exit away from the analog card.)
3. Replace the cover.

❑ ANALOG CARD

Materials Required

#2 Phillips screwdriver

Remove

1. Remove the cover.
2. Gently disconnect the read/write head connector from the front of the analog card (Figure 1, #1).
3. Disconnect the ribbon cable from the rear of the card (Figure 1, #2).
4. Disconnect the motor connector from the rear of the card (Figure 1, #3).

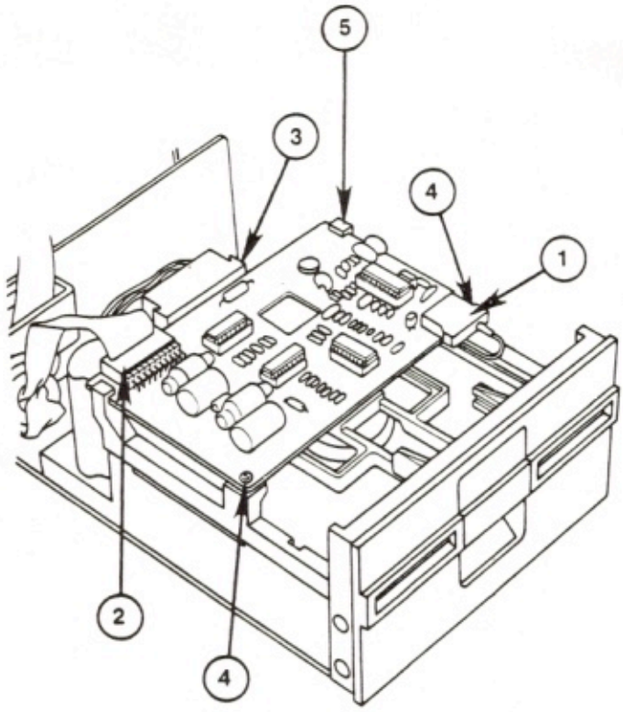


FIGURE 1

5. Remove the two screws at the front of the analog card (Figure 1, #4).

 Note: These screws may have either standard or metric threads. To avoid intermixing, keep the screws with the disk drive they were taken from.

6. Slide the card forward past the retaining slots at the rear (Figure 1, #5), and then lift it out.

Replace

1. Slide the card into position in the retaining slots of the rear support posts (Figure 1, #5).

2. Reinstall the two screws (Figure 1, #4) to hold the card in place.

3. Reconnect the read/write head connector (Figure 1, #1) to the card. Make sure that there is just enough loop in the cable so that it doesn't pull down on the head connector.

4. Reconnect the motor connector (Figure 1, #3) at the rear of the card.

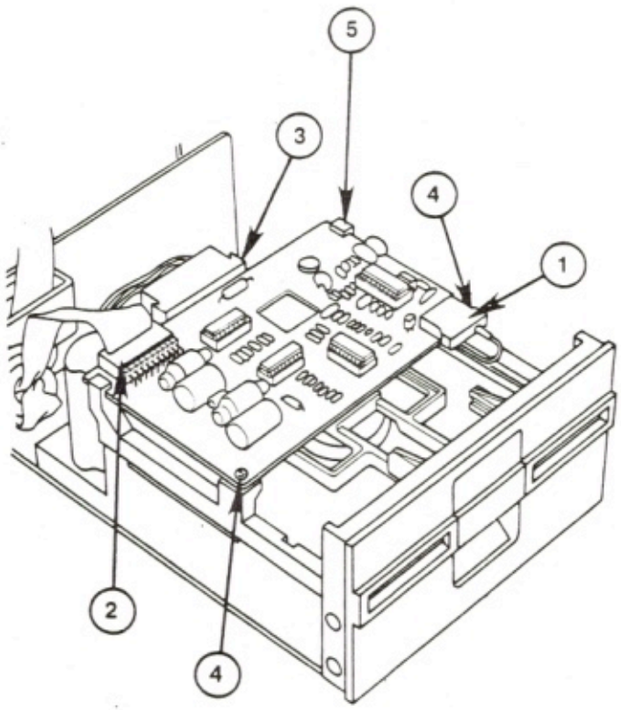


FIGURE 2

5. Reconnect the ribbon cable connector (Figure 2, #2) at the rear of the card, making sure that both rows of pins align with holes in the connector.

6. Replace the cover.

Apple Technical Procedures

Disk II

Section 2 – Troubleshooting

❑ CONTENTS

2.2 Introduction
2.2 General Information
2.2 How to Use the Symptom Chart
2.3 Symptom Chart
2.4 Analog Card Troubleshooting
2.4 Materials Required
2.4 System Setup
2.4 Visual Inspection
2.5 Symptoms
2.5 System Will Not Boot
2.6 Drive Will Not Read or Write
2.7 Drive Has Trouble Reading
2.7 Drive Has Trouble Writing
2.8 Write-Protect Circuit Malfunctions

❑ INTRODUCTION

General Information

These procedures provide guidelines for troubleshooting the Apple® Disk II® disk drive using the following tools:

- *Apple 5.25-Inch Disk Drive Diagnostic*
- Symptom/Corrective Action Chart

How to Use the Symptom Chart

The *Symptom Chart* describes symptoms and appropriate steps to take to correct the failure.

When swapping out modules, remove the suspected faulty module and replace it with a known-good spare module. If the problem still occurs, remove the replacement module, re-install the original module in the Disk II, and try swapping out the next module on the list. Repeat the procedure until the problem no longer occurs. The module you replaced just before the problem disappeared is the faulty one. As a final check of the system, run the disk drive diagnostic.

❑ SYMPTOM CHART

Symptom	Corrective Action
• *Drive comes on but will not boot. System gives I/O errors during normal operation.*	1. Clean read/write head. 2. Adjust DSPEED. 3. Exchange interface cable. 4. Exchange analog card. 5. Exchange mechanical assembly.
• *Drive will not boot. Drive does not come on.*	1. Exchange interface cable. 2. Exchange mechanical assembly. 3. Exchange analog card.
• *Drive makes high pitched whining sound.*	– Exchange mechanical assembly.
• *Drive writes when diskette is protected.*	1. Adjust write-protect switch. 2. Exchange analog card. 3. Exchange mechanical assembly.
• *Drive reads but does not write.*	– Exchange analog card.

❑ ANALOG CARD TROUBLESHOOTING

The following procedures outline the troubleshooting procedures for the Disk II analog card. **Follow all of the procedures in this section to ensure that no potential problems are overlooked.**

Materials Required

Small flatblade screwdriver
Apple II, II Plus, IIe or IIGS system
Disk II (complete) with disk controller card
Known-good Disk II mechanical assembly and interface cable
Copy of *DOS 3.3 System Master* diskette (not write protected)
Blank diskette
Replacement ICs (one each):
- 74LS125
- 2003
- 3470
- 3146

CAUTION: *Be sure to turn off the power to the computer before replacing any of the components on the analog card.*

System Setup

For the analog card to be correctly diagnosed, it must be the only unknown variable in the test system. Using all known-good, verified components, assemble them as follows:

1. Place the analog card to be tested on the known-good mechanical assembly, and connect all cables so that this drive is drive 2 in the system.

2. Place the disk controller card in slot 6 of the computer.

Visual Inspection

Examine the suspect analog card for visual signs of damage. This may take one of several forms:

1. Burned or melted ICs or sockets. Remove each of the four ICs and closely examine them and the sockets. Replace all damaged ICs with good ones. Return all analog cards with damaged sockets to Apple.

2. Capacitor C4 (large capacitor at corner of card) may be visibly damaged (burned, exploded, melted). These cards should be returned to Apple for repair.

3. Components other than the four ICs may be physically damaged and in need of replacement. These cards should be returned to Apple for repair.

CAUTION: *Do not use an eraser to clean gold contacts. Use only a liquid or spray contact cleaner and a clean cloth.*

Symptoms

A malfunctioning analog card may manifest symptoms in one of five ways:

1. Drive 1 will not boot (with bad drive 2 analog card connected).

2. Drive will not read or write (could destroy data).

3. Drive has trouble reading.

4. Drive has trouble writing.

5. The write-protect switch circuit malfunctions.

A troubleshooting procedure for each type of failure follows.

System Will Not Boot

An analog card can be damaged in such a way that when it is connected to drive 2, it keeps drive 1 from booting normally. To test for this condition:

1. Place the analog card to be tested on the drive 2 mechanical assembly and connect the cables from the stepper motor, the read/write head, and the disk controller.

2. Turn on the power to the computer. The DOS diskette should boot and display the Applesoft prompt (]) on the screen. If the diskette does not boot, turn off the power to the computer and replace the following devices, one at a time, repeating this step after each swap until the diskette boots.

 IC at D4 (labelled 2003)
 IC at B4 (labelled 74LS125)
 IC at A3 (labelled CA3146)
 IC at B1 (labelled 3470)

If the DOS diskette still fails to boot, place all original ICs in their sockets and return the analog card to Apple.

Drive Will Not Read or Write

If the DOS diskette boots sucessfully in drive 1, perform the following steps:

1. Turn off the power to the computer, remove the *DOS 3.3 System Master* diskette from drive 1 and insert the *Apple 5.25-Inch Disk Drive Diagnostic* diskette in drive 1. Turn the power on. The main menu will be displayed.

2. Refer to the *Disk Drives Technical Procedures*, Section 1, Apple 5.25-Inch Disk Drive Diagnostic, and run the DSPEED test.

3. Referring to Section 3, Adjustments, perform the DSPEED adjustment. If the drive speed indicator does not move to reflect the speed adjustment, this circuit is faulty; turn off the power to the computer and replace the following devices (except those which have been replaced previously), one at a time, repeating this test after each device until the indicator moves reflecting the speed changes.

 IC at B1 (labelled 3470)
 IC at A3 (labelled 3146)
 IC at B4 (labelled 74LS125)
 IC at D4 (labelled 2003)

If you replace all of the ICs on the analog card and the DSPEED indicator still fails to move, place all original ICs in their sockets and return the card to Apple.

Drive Has Trouble Reading

If the drive performed the DSPEED test successfully, perform the following steps:

1. Boot the *DOS 3.3 System Master* in drive 1, then remove it and place it in drive 2.

2. Type CATALOG,D2 and press <Return>. Watch drive 2 for activity. The video screen should display the catalog of the *DOS 3.3 System Master* diskette. If this does not occur, replace the following devices according to the observed symptoms:

Symptom	IC	Location
Head does not move	2003	D4
Disk does not turn	2003	D4
Drive recalibrates repeatedly	3470	B1
I/O ERROR message	3470	B1
" "	3146	A3
" "	74LS125	B4
" "	2003	D4

If you have replaced all of the ICs on the analog card and the catalog still does not display, place all original ICs in their sockets and return the card to Apple.

Drive Has Trouble Writing

If the analog card correctly displays the catalog of drive 2, perform the following steps:

1. Boot the *DOS 3.3 System Master* diskette in drive 1, and then move it to drive 2.

2. Type CATALOG,D2 and press <Return>. The catalog will be displayed on the video screen. Files displayed with an asterisk (*) preceding the filename are locked and may not be deleted. Note that the filename **HELLO** is preceded by an asterisk.

3. Type UNLOCK HELLO and press <Return>.

4. Type CATALOG,D2 and press <Return>. The catalog will be displayed on the video screen. Verify that filename **HELLO** is not preceeded by an asterisk. If you encounter trouble when attempting to unlock the file, turn off the power to the computer and replace the following devices (except those which have been replaced previously), one at a time, repeating this test after each device until the UNLOCK command executes successfully:

 IC at B4 (labelled 74LS125)
 IC at D4 (labelled 2003)
 IC at A3 (labelled 3146)

5. Type LOCK HELLO and press <Return> to re-lock the file.

If you have replaced all of the ICs on the analog card and the file still does not unlock, place all original ICs in their sockets and return the card to Apple.

Write-Protect Circuit Malfunctions

If the write-protect circuit malfunctions:

1. Place a write-protect tab on the *DOS 3.3 System Master* diskette and insert the diskette in drive 2.

2. Repeat steps 2 and 3 above (under "Drive Has Trouble Writing"). The video screen should display **WRITE PROTECT ERROR**. If this does not occur, replace the 74LS125 at location B4 and repeat this test.

If the screen still does not display **WRITE PROTECT ERROR**, place all original ICs in their sockets and return the analog card to Apple.

Apple Technical Procedures

Disk II

Section 3 – Adjustments

❑ CONTENTS

3.3 Introduction
3.3 DSPEED
3.4 Write-Protect Switch

Note: If a step is underlined, detailed instructions for that step can be found in Section 1, Take-Apart.

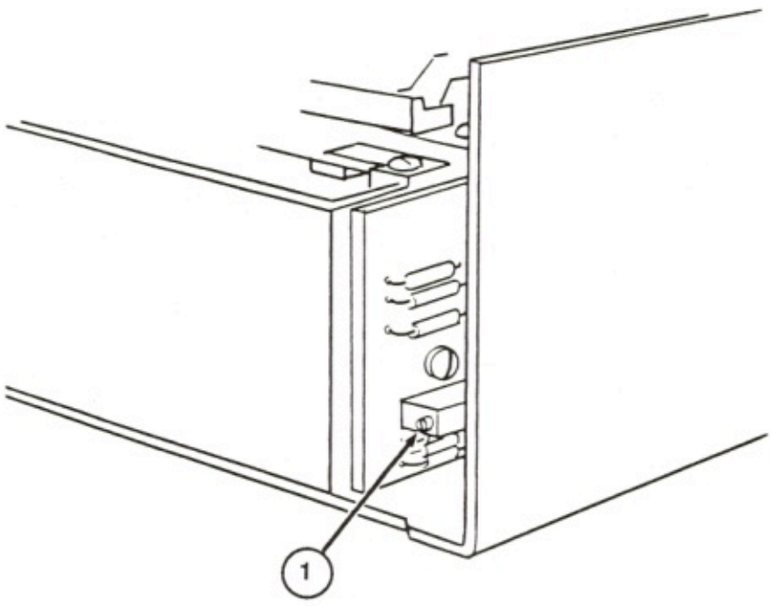


FIGURE 1

❑ INTRODUCTION

These adjustment procedures were written to be used with the *Apple 5.25-Inch Disk Drive Diagnostic*—if the test indicates that you need to adjust the drive speed or if the write-protect test fails. All information on setting up and running the diagnostic is in the *Disk Drives Technical Procedures*, Section 1, 5.25-Inch Disk Drive Diagnostic.

❑ DSPEED

Materials Required

Apple 5.25 Inch Disk Drive Diagnostic diskette
Disk Drives Technical Procedures manual
A small (jeweler's) flatblade screwdriver
Apple II, II Plus, IIe, or IIGS
Known-good Disk II and interface card
Disk II to be adjusted

Making the Adjustment

To adjust the DSPEED (drive motor speed):

1. Remove the cover of the drive to be adjusted.

2. Run the DSPEED diagnostic (see the *Disk Drives Technical Procedures*, Section 1, 5.25-Inch Disk Drive Diagnostic). The diagnostic should be run from a known-good drive connected to the interface card as drive 1, and the drive to be adjusted should be connected as drive 2.

3. Look at the back of the drive mechanism. Locate the motor control board mounted on the edge, and locate the potentiometer that has a screwdriver adjustment on the side (Figure 1, #1). (Do not confuse this potentiometer with the potentiometers on the analog card.)

 Note: When you make the DSPEED adjustment, keep the disk drive flat.

4. The adjustment is extremely sensitive, so turn the adjustment screw very slowly. The indicator on the screen will move back and forth, showing changes of the speed.

5. Adjust the speed so that it stays within the "good" range, as close to 0 as possible. Let the test run for 30 seconds.

6. Press <Escape> to return to the main menu; then repeat the test.

 Does the DSPEED now stay within the "good" range?

 - Yes—Press <Escape> to return to the main menu.

 - No—If the DSPEED cannot be properly adjusted, return the faulty mechanical assembly to Apple.

7. Remove the diagnostic diskette from the drive.

8. Replace the cover.

❑ WRITE-PROTECT SWITCH

Materials Required

Scratch diskette (not write protected)
Small flatblade screwdriver

Making the Adjustment

To adjust the write-protect switch:

1. Note the two setscrews holding the write-protect switch in place (Figure 2, #1 and #2). The switch is located on the front left side of the drive as you face the drive door. The far setscrew (Figure 2, #1) forms a pivot for the switch; the near setscrew (Figure 2, #2) sets the switch position.

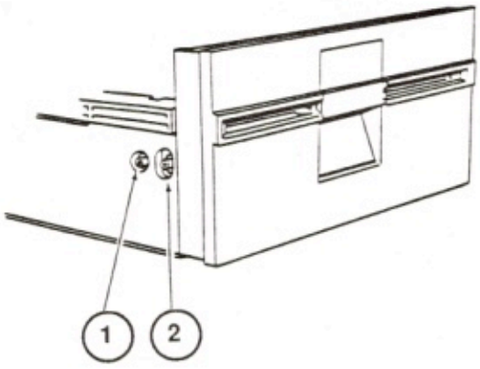


FIGURE 2

2. Insert the scratch diskette all the way and leave the disk drive door open.

3. Loosen the rear setscrew. Then loosen the front setscrew, raise up on it until the switch disables, and tighten the setscrew.

4. Tighten the rear setscrew.

5. Check the adjustment by withdrawing the diskette approximately one-inch. The switch should be enabled.

 Note: If the switch continues to show a disabled condition, reboot and try the procedure again.

6. Verify the adjustment again by pushing the diskette fully into the disk drive and then withdrawing it approximately one inch. The condition should change from disabled to enabled.

Apple Technical Procedures

Disk II

Section 4 – Preventive Maintenance

❑ CONTENTS

4.2 Introduction
4.2 Read/Write Head
4.3 Head Load Button
4.4 Motor Drive Belt

Note: If a step is underlined, detailed instructions for that step can be found in Section 1, Take-Apart.

❑ INTRODUCTION

The read/write head should be cleaned any time the computer or disk drive is being serviced. The head load button should be replaced whenever it is worn or dirty. The motor drive belt should be inspected any time the disk drive is being serviced.

❑ READ/WRITE HEAD

Materials Required

#2 Phillips screwdriver
Cotton swabs
Isopropyl Alcohol (80% alcohol/20% water)

Procedure

To service the read/write head:

1. Remove the case and analog board
2. Clean the guide rails with the isopropyl alcohol. **Do not** use grease.
3. Inspect the head for worn or dull spots in the ceramic. If you find any, replace the mechanical assembly.
4. Clean the head with the isopropyl alcohol.
5. Move the read/write head assembly back and forth along the full length of its travel. Check for any blockage or friction. If there is any, replace the mechanical assembly.
6. Replace the analog board and case.

❑ HEAD LOAD BUTTON

Materials Required

#2 Phillips screwdriver
Needlenose pliers
Head load button

Procedure

To service the head load button:

1. Remove the case and analog board.

2. Lift up the head load arm. If the head load button is worn or dirty, squeeze the top part of the load button with small needlenose pliers, and let the button drop down.

 Note: Some head load buttons are glued. If the glue cannot be broken, send the mechanical assembly to Apple for servicing.

3. Insert the new load button into the head load arm. Press the button until it snaps into place.

4. Replace the analog board and case.

❑ MOTOR DRIVE BELT

Materials Required

#2 Phillips screwdriver
Motor drive belt

Procedure

To service the motor drive belt:

1. Remove the case.
2. Turn the drive upside down. Locate the motor drive belt and check it for cracks, slippage, and elasticity. If the belt is dry or cracked, or if it slips, continue with step 3.
3. Slip the belt off the pulley.
4. Place the new belt around the motor spindle and then slip it around the pulley.
5. Replace the case.

Apple Technical Procedures

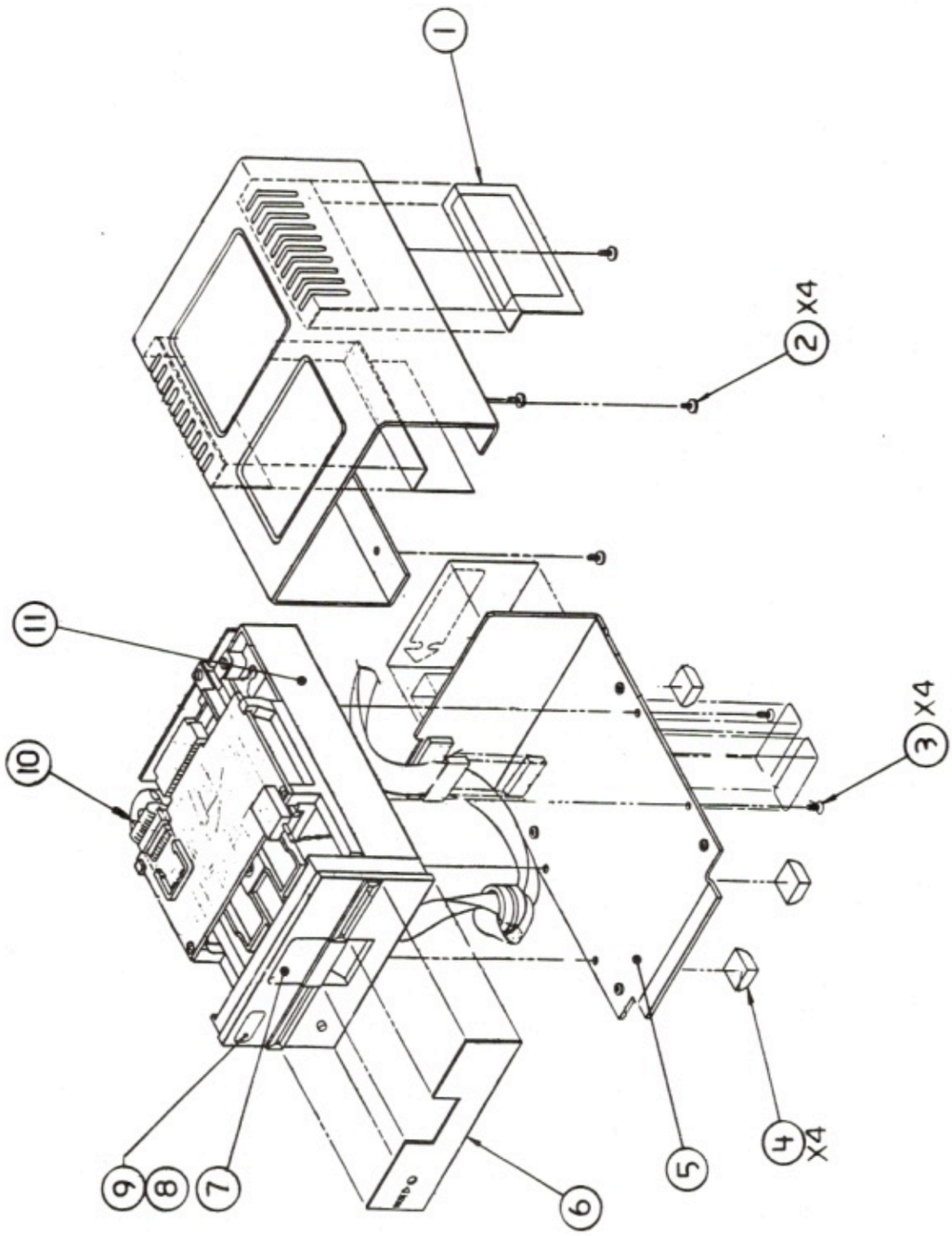
Disk II

Section 5 – Illustrated Parts List

❑ CONTENTS

5.3 Finished Goods Assembly (Figure 1)
5.5 Internal Parts (Figure 2)
5.7 ICs (Figure 3)

The figures and lists in this section include all piece parts that can be purchased separately from Apple for the Disk II, along with their part numbers. These are the only parts available from Apple. Refer to your *Apple Service Programs Manual* for prices.


1
2 X4
3 X4
4 X4
5
6
7
8
9
10
11

❑ DISK II – FINISHED GOODS ASSEMBLY (Figure 1)

Item	Part No.	Description
1	825-0009	Cover, Case Slots, Disk II
2	403-1606	Screw, 6-32 x 3/8, DRPHD, Disk II
3	400-3604	Screw, 6-32 x 1/4, Pozi-Drive Flat Head, Disk II
4	865-0001	Rubber Feet
5	805-0005	Chassis Base, Disk II
6	825-0005	Disk II Front Name Plate Label
7	U815-0066	Door & Hinge Assembly
8	825-0011	Multiple Drive ID #1, Label
9	825-0012	Multiple Drive ID #2, Label
10	590-0031	Disk II Cable Assembly, 15" LG
11	661-92012	Disk II Mechanical Assembly

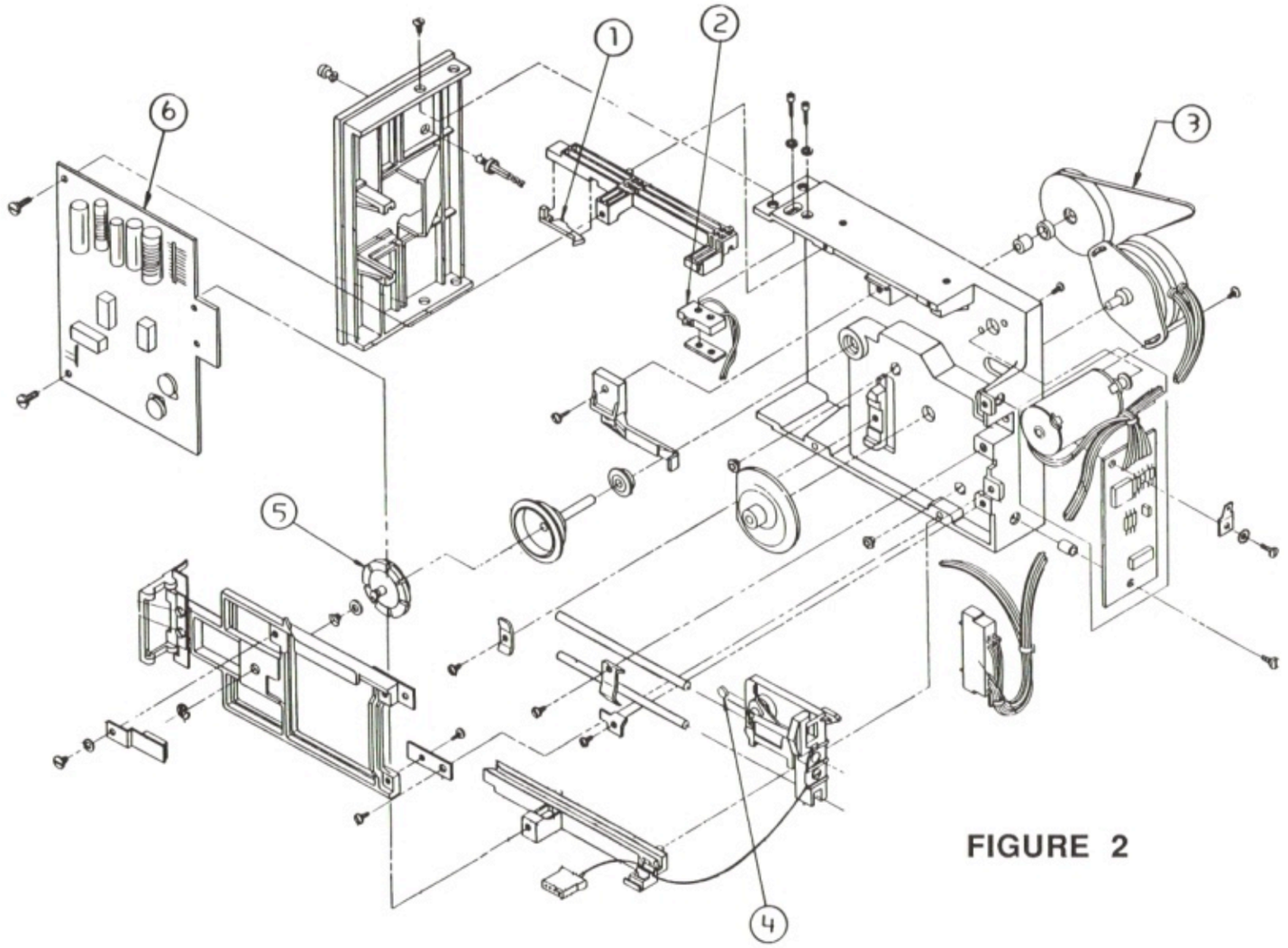
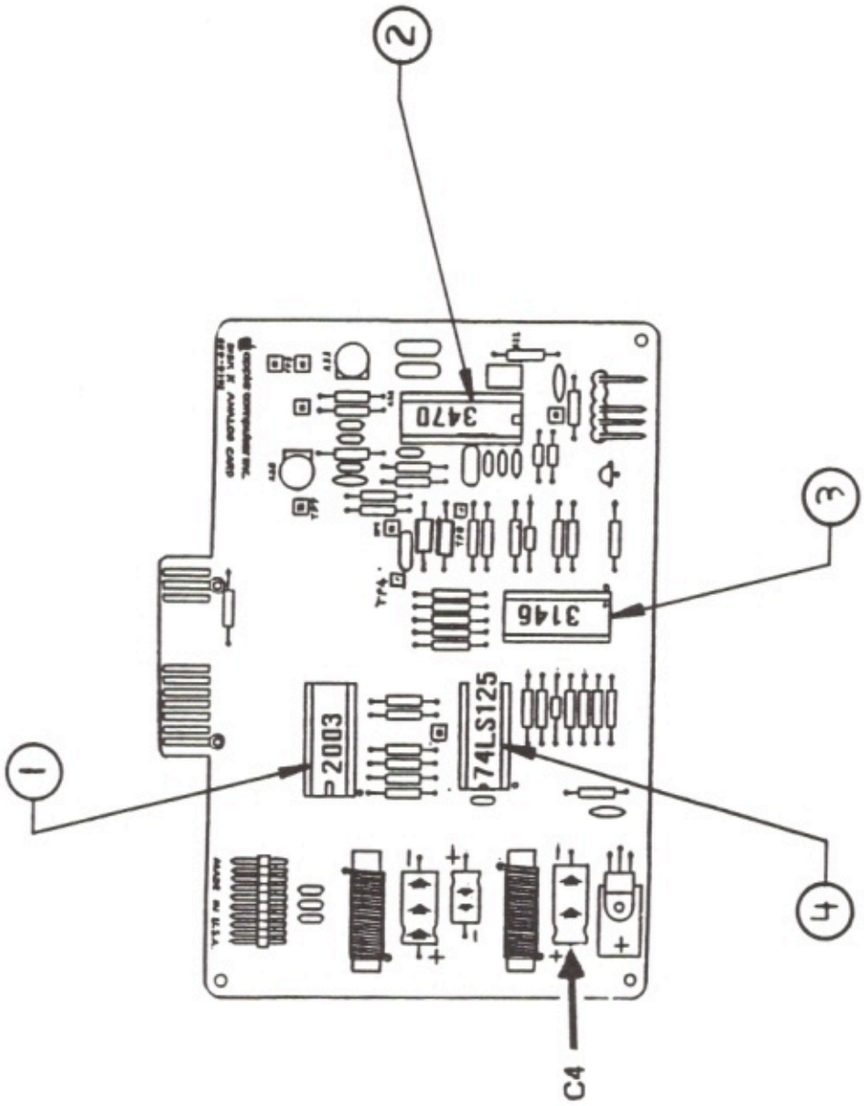


FIGURE 2

❑ DISK II – INTERNAL PARTS (Figure 2)

Item	Part No.	Description
1	815-0377	Write Protect Actuator (Alps)
	U815-0073	Write Protect Actuator (Shugart)
2	U705-0005	Write Protect Switch DII-III
3	U880-0002	Disk Drive Belt
4	U815-0064	Load Button
5	U815-0067	Disk II Collet Hub
6	661-92001	Disk II Analog Card


2
3
1
4
3470
3146
2003
74LS125
C4

❑ DISK II – ICs (Figure 3)

Item	Part No.	Description
1	327-2003	IC 2003A
2	355-3470	IC MC3470
3	352-3146	IC 3146
4	306-0125	IC 74LS125


Disk ///

Apple Technical Procedures

Disk III

Technical Procedures

❑ TABLE OF CONTENTS

Section 1 – Take-Apart	1.2	Case
	1.3	Shield and Ribbon Cable
	1.6	Analog Card
	1.8	Drive Door
Section 2 – Troubleshooting	2.2	Introduction
	2.2	Materials Required
	2.2	System Setup
	2.3	Visual Inspection
	2.4	Troubleshooting
	2.4	Symptoms
	2.4	System Will Not Boot
	2.5	Drive Will Not Read or Write
	2.5	Drive Has Trouble Reading .
	2.6	Drive Has Trouble Writing
	2.7	Write-Protect Circuit Malfunctions
	2.8	Diskette-Switched Circuit Malfunctions
Section 3 – Adjustments	3.3	Introduction
	3.3	DSPEED
	3.3	Making the Adjustment
	3.4	Write-Protect Switch
	3.4	Making the Adjustment
Section 4 – Preventive Maintenance	4.2	Introduction
	4.2	Read/Write Head
	4.3	Head Load Button
	4.3	Motor Drive Belt

Section 5 – Illustrated Parts List

5.3 Complete Assembly (Figure 1)
5.5 Internal Parts (Figure 2)
5.7 Analog Card (Figure 3)

©Apple Computer, Inc., 1982, 1984, 1985, 1986, and 1987. No portion of this document may be reproduced in any form without the written permission of Apple Computer, Inc.

Apple and the Apple logo are registered trademarks of Apple Computer, Inc.

Apple Technical Procedures

Disk III

Section 1 – Take-Apart

❑ CONTENTS

1.2 Case
1.3 Shield and Ribbon Cable
1.6 Analog Card
1.8 Drive Door

Note: If a step is underlined, detailed instructions for that step can be found elsewhere in this section.

❑ CASE

Materials Required

#2 Phillips screwdriver

Remove

1. Turn the drive over with the bottom-side up and remove the four Phillips screws.
2. Lift the bottom cover up from the rear and remove it. Turn the unit so that the top side is up and the back of the unit is toward you.
3. Remove the single Phillips screw from the back panel.
4. Holding on to the bottom front of the top cover, pull the cover slightly forward and up until it clears the interior parts of the drive. Set cover aside.

Replace

1. Replace the top cover. With the unit top side up, set the cover over the back edge of the Disk III; then pull the cover slightly forward as you slide it down over the disk drive door.
2. Replace the single Phillips screw on the back panel.
3. Turn the drive over and replace the bottom cover.
4. Replace the four Phillips screws and turn the drive top side up.

❑ SHIELD AND RIBBON CABLE

Materials Required

#2 Phillips screwdriver

Remove

1. Remove the case.

2. Remove the flat cable from the back of the drive by pressing the strain relief guard (see Figure 1) out of the slot and removing the cable.

 Note: It can be difficult to release the strain relief guard. If so, slip a screwdriver inside the metal shield and pry down on the guard while simultaneously pulling down and out from outside. (You may use large pliers to compress the guard enough to separate it from the mounting bracket, but be sure you don't crush the cable.) The strain relief guard will come apart in two pieces.

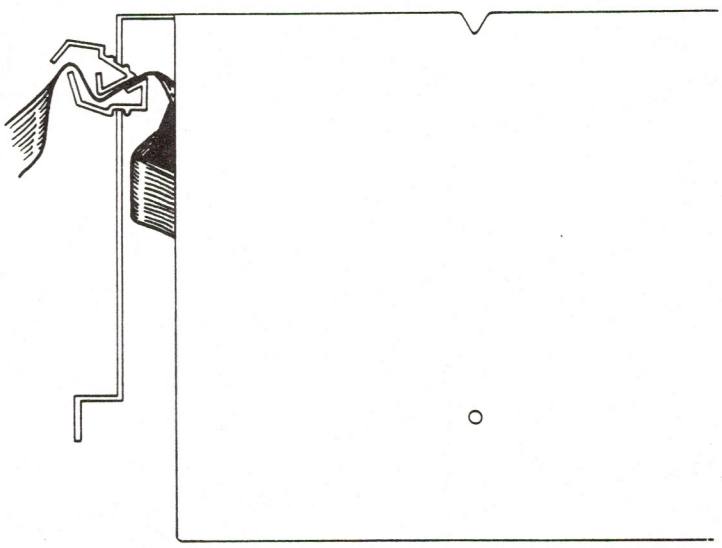


FIGURE 1

3. Remove the four Phillips screws holding the metal shield to the drive chassis.

4. Slide the metal shield cover back and off the drive, being careful not to pull on the cable as it is still connected to the analog card.

5. Disconnect the ribbon cable connector from the analog card (Figure 2, #2). It might be fastened very securely, so grasp the connector and pull back firmly until it disconnects. It may help to wiggle it gently back and forth as you pull back, but be careful not to bend the connector pins.

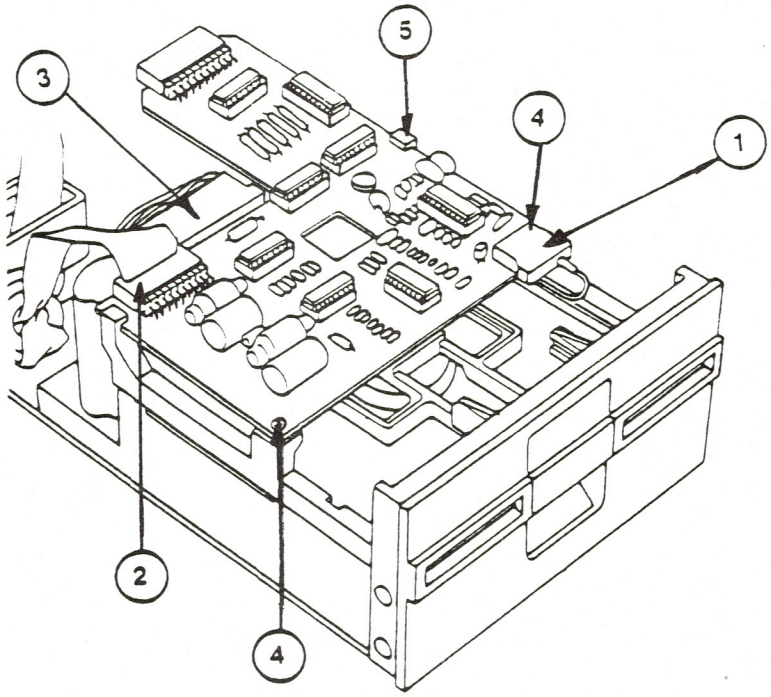


FIGURE 2

6. If you are replacing the ribbon cable, twist the cable connector slightly, push it through the toroids, and remove the toroids from the cable.

Replace

1. Place the two toroids onto one end of the replacement cable, looping the cable through the toroids. Leave about three inches of cable between the toroids and the connector (see Figure 3, #1).

2. Place the cable just above the toroids into the nylon cable holder and snap the holder shut.



FIGURE 3

3. Attach the ribbon cable connector to the analog card, making sure that both rows of pins align with the holes in the connector (Figure 2, #2).

4. Replace the strain relief guard at the back of the metal shield. Fit the guard as closely as possible to the toroid while leaving yourself enough cable to work with.

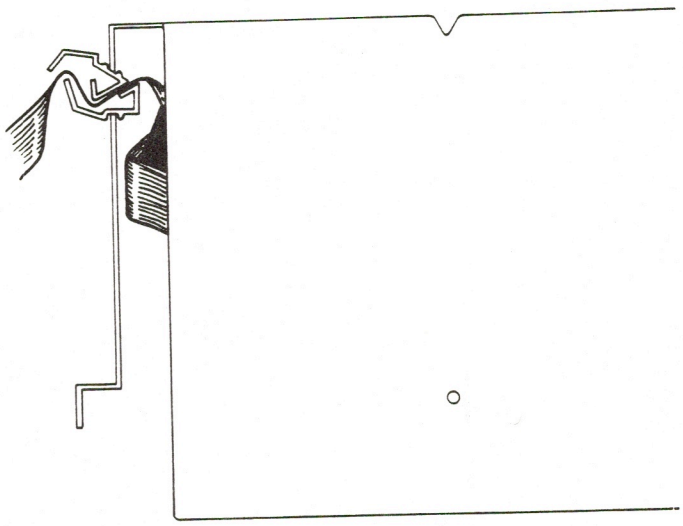


FIGURE 4

Make an "S" in the cable right next to the metal shield. Fit the bottom portion of the "S" into the one part of the strain relief with the triangle side fitting inside the metal shield. The other part of the strain relief fits with the triangle against the cable and into the lower portion of the strain relief. The top part then slips inside the metal shield (Figure 4).

5. Replace the four screws on the sides of the metal shield.

6. Replace the case.

❑ ANALOG CARD

Materials Required

#2 Phillips screwdriver

Remove

1. Remove the case and drive shield.

2. Disconnect the read/write head connector from the front of the analog card (Figure 5, #1).

3. Disconnect the ribbon cable connector at the rear of the analog card (Figure 5, #2).

4. Remove the two screws at the front of the analog card (Figure 5, #4).

5. Slide the analog card back past the retaining slots at the rear, and then lift it out (Figure 5, #5).

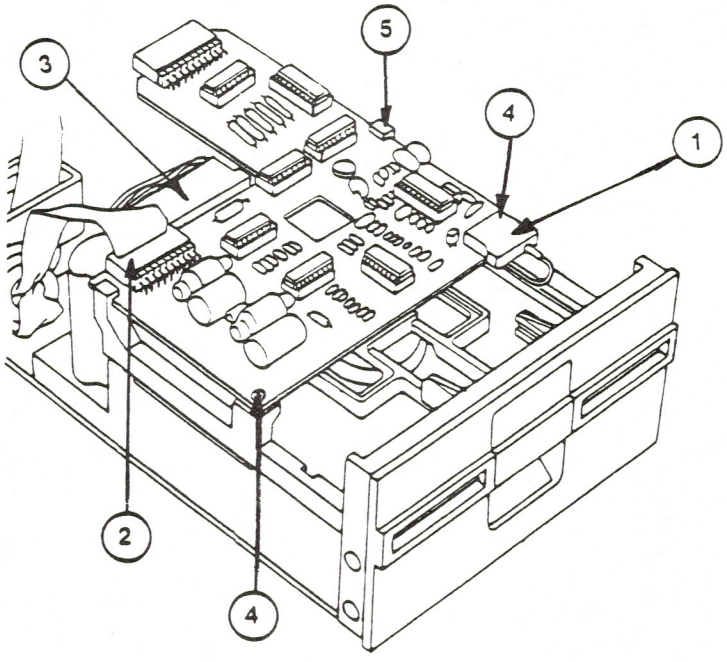


FIGURE 5

Replace

1. Slide the analog card through the retaining slots (Figure 5, #5) and into position.

2. Replace the two screws to hold the board in place (Figure 5, #4).

3. Attach the read/write head connector to the front of the analog card (Figure 5, #1). Ensure that there is just enough loop in the cable so that it doesn't pull down on the molex connector.

4. Attach the ribbon cable connector at the rear of the analog card (Figure 5, #2).

5. Replace the drive shield and case.

❑ DRIVE DOOR

Materials Required

#2 Phillips screwdriver

Remove

1. Remove the case.
2. Remove the four Phillips screws, two on each side of the front bezel (panel) of the unit.
3. Tilt the bezel forward.
4. Remove the two screws that hold the door in place (Figure 6, #2), and remove the door assembly.

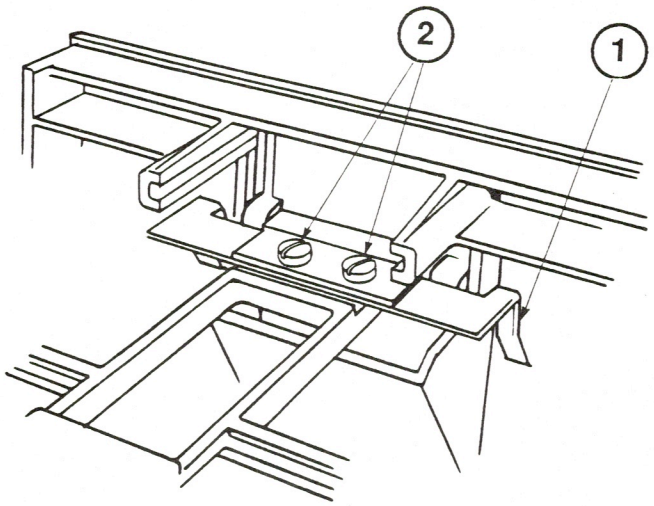


FIGURE 6

Replace

1. Set the new door in place, noting the position of the door guides (Figure 6, #1), and replace the screws to hold it in place.
2. Replace the bezel and two of the screws to hold it in place.
3. Insert a scratch diskette into the drive and allow it to center properly.

4. While gently closing the drive door, observe the two guide bars (Figure 6, #1), which are visible when viewed from the back of the drive looking toward the front. The guide should not bind against the diskette or cause it to buckle.

5. If there is binding, or if the door is crooked, unscrew the bezel and tilt it forward so that you can loosen the two screws that hold the door in place. Make sure the two plastic protrusions on the top of the door slide through the two plastic guides on the bezel and that the door looks centered.

6. With the bezel tilted forward, tighten the two screws to hold the door into the correct position.

7. Put the bezel into its normal position and replace the remaining two screws (Figure 6, #2).

8. Replace the case.

Apple Technical Procedures

Disk III

Section 2 – Troubleshooting

❑ CONTENTS

2.2 Introduction
2.2 Materials Required
2.2 System Setup
2.3 Visual Inspection
2.4 Troubleshooting
2.4 Symptoms
2.4 System Will Not Boot
2.5 Drive Will Not Read or Write
2.5 Drive Has Trouble Reading .
2.6 Drive Has Trouble Writing
2.7 Write-Protect Circuit Malfunctions
2.8 Diskette-Switched Circuit Malfunctions

Note: If a step is underlined, detailed instructions for that step can be found in Section 1, Take-Apart.

❑ INTRODUCTION

The following pages outline the troubleshooting procedures for the Disk III disk drive analog card. **Follow all of the procedures in this section to ensure that no potential problems are overlooked.**

Materials Required

Small flatblade screwdriver
Apple III system with video display
Disk III mechanical assembly
External Disk III Interface Cable
Apple II Emulation diskette
Copy of *DOS 3.3 System Master* diskette (not write protected)
Copy of *Apple Business Basic* diskette
Blank diskette
Replacement ICs (one each):
- 74LS125
- 2003
- 3470 (Motorola)
- 3146
- 74LS74
- 74LS32

CAUTION: *Be sure to turn off the power to the computer before replacing any of the components on the analog card.*

System Setup

For the analog card to be correctly diagnosed, it must be the only unknown variable in the test system. So, using all known-good, verified components, assemble them as follows:

1. Place the analog card to be tested on the external drive mechanical assembly and connect the stepper motor cable and read/write head cable.

2. Connect the external cable between the analog card and the external drive port of the Apple III.

Visual Inspection

Inspect the analog card for out-of-date versions by looking for printed circuit board (PCB) reworking, such as:

1. R32 (location D1) is missing.

2. IC at location E1 is missing.

3. Jumper wires soldered to the back of the board.

Return to Apple all analog cards with any of the above conditions. Next, examine the suspect analog card for damage such as:

1. Burned or melted ICs or sockets. Remove each of the six ICs and closely examine them and the sockets. Replace all damaged ICs with good ones. Return all analog cards with damaged sockets to Apple.

2. Capacitor C4 (large capacitor at corner of card) may be visibly damaged (burned, exploded, melted). These cards should be returned to Apple for repair.

3. Components other than the six ICs and capacitor C4 may be physically damaged and in need of replacement. These cards should be returned to Apple for repair.

WARNING: *Do not use an eraser to clean gold contacts. Use only a liquid or spray contact cleaner and a clean cloth.*

❑ TROUBLESHOOTING

Symptoms

A malfunctioning analog card may manifest one of the following five symptoms:

1. Drive 1 will not boot (with bad external drive analog card connected).
2. Drive will not read or write (could destroy data).
3. Drive has trouble reading.
4. Drive has trouble writing.
5. The diskette-switched circuit malfunctions.

A troubleshooting procedure for each of the above failure mode follows.

System Will Not Boot

It is possible for an analog card to be damaged in such a way that when it is connected to the external drive it keeps the internal drive from booting normally. To test for this condition:

1. Place the analog card to be tested on the external drive mechanical assembly, and connect the cables from the stepper motor, the read/write head, and connect the drive to the computer.
2. Place the *Apple II Emulation* diskette in the internal drive and turn on the power to the computer. The Emulation display will appear on the video screen. If the diskette does not boot, turn off the power to the computer and replace the following devices one at a time, repeating this step after each replacement until the diskette boots.

 IC at C4 (labelled 2003)
 IC at G2 (labelled 74LS125)
 IC at A3 (labelled CA3146)
 IC at B1 (labelled 3470)
 IC at E2 (labelled 74LS74)

If the emulation diskette still fails to boot, place all original ICs in their sockets, and return the analog card to Apple.

Drive Will Not Read or Write

If the emulation diskette boots successfully in the internal drive, perform the following steps:

1. Run the DSPEED test from the *Apple 5.25-Inch Disk Drive Diagnostic*. For instructions on setting up and running the diagnostic, refer to the "5.25-Inch Disk Drive Diagnostic" section in *Disk Drives Technical Procedures.*

2. Locate the DSPEED adjustment screw on the motor control board at the right rear of the mechanical assembly. Adjust this potentiometer while observing the drive speed indicator on the video display. If the value changes and the arrow moves as you turn the adjustment, this portion of the circuit is functional; proceed to the "Drive Has Trouble Reading" procedure. If the drive speed indicator does **not** move to reflect the speed adjustment, this circuit is faulty; turn off the power to the computer and replace the following devices (except those which have been replaced previously), one at a time, repeating this test after each device until the indicator moves reflecting the speed changes (then proceed to the DSPEED adjustment, Section 3, to adjust the motor speed to specification):

 IC at B1 (labelled 3470)
 IC at A3 (labelled 3146)
 IC at G4 (labelled 74LS125)
 IC at C4 (labelled 2003)
 IC at E2 (labelled 74LS74)
 IC at F1 (labelled 74LS32)

 If you replace all of the ICs on the analog card and the DSPEED indicator still fails to move, place all original ICs in their sockets and return the card to Apple.

Drive Has Trouble Reading

If the drive will perform the DSPEED test successfully, perform the following steps:

1. Boot the *Apple II Emulation* diskette in the internal drive.

2. Once the Apple II Emulation menu appears on the screen, complete the boot process by placing the *DOS 3.3 System Master* diskette in the internal drive and pressing <Return>.

3. Move the DOS 3.3 diskette to the external drive.

4. Type CATALOG,D2, press <Return>, and watch the external drive for activity. The video screen should display the catalog of the *DOS 3.3 System Master* diskette. If this does not occur, replace the following devices according to the observed symptoms:

Symptom	IC	Location
In-Use light off	74LS32	F1
" "	74LS125	G2
" "	2003	C4
" "	74LS74	E2
Motor off,		
In-Use LED on	74LS32	F1
Head does not move	2003	C4
Head moves erratically	2003	C4
Recalibrates repeatedly	3470	B1
I/O ERROR message	3470	B1
" "	3146	A3
" "	74LS125	G2
" "	2003	C4
" "	74LS32	F1
" "	74LS74	E2

If you have replaced all of the ICs on the analog card and the catalog still does not appear on the monitor, place all original ICs in their sockets and return the card to Apple.

Drive Has Trouble Writing

If the analog card correctly displays the catalog of the external drive, perform the following steps:

1. Type CATALOG,D2 and press <Return>. The catalog will be displayed on the video screen. Files displayed with an asterisk (*) preceding the filename are locked and may not be deleted. Note that filename **HELLO** is preceded by an asterisk.

2. Type UNLOCK HELLO and press <Return>.

3. Type CATALOG and press <Return>. The catalog will be displayed on the video screen. Verify that filename **HELLO** is not preceeded by an asterisk. If you encounter trouble when attempting to unlock the file, turn off the power to the computer and replace the following devices (except those which have been replaced previously), one at a time, repeating this test after each device until the UNLOCK command executes successfully:

Symptom	IC	Location
I/O ERROR message	3470	B1
" "	3146	A3
WRITE PROTECTED error message	74LS125	G2
" "	74LS74	E2
Drive recalibrates repeatedly	3470	B1

4. Type LOCK HELLO and press <Return> to re-lock the file.

If you have replaced all of the ICs on the analog card and you still experience trouble writing to the drive, place all original ICs in their sockets and return the card to Apple. Otherwise, go on to the next procedure.

Write Protect Circuit Malfunctions

If the write-protect circuit malfunctions:

1. Place a write-protect tab on the *DOS 3.3 System Master* diskette and insert the diskette in the external drive.

2. Repeat steps 2 and 3 above (in the "Drive Has Trouble Writing" procedure). The video screen should display the **WRITE PROTECTED** error message. If this does not occur, replace the following device (unless it has been replaced previously) according to the symptom listed, and repeat this test.

Symptom	IC	Location
File remains locked	74LS125	G2
" "	74LS74	E2
I/O ERROR message	74LS125	G2
" "	74LS74	E2
" "	74LS32	F1

If the screen still does not display the **WRITE PROTECTED** message, place all original ICs in their sockets and return the analog card to Apple.

Diskette-Switched Circuit Malfunctions

The diskette-switched circuit detects the changing of the diskette. Due to the difference in the way the computer reads the directory in Apple II-emulation mode, this circuit must be tested in Apple II-emulation mode as well as in Apple III mode.

1. Boot the *Apple Business Basic* diskette in the internal drive and then move it to the external drive.

2. Type CATALOG .D2 and press <Return>. The disk catalog will display on the video screen.

3. Rest the eraser end of a common pencil lightly on the cam of the external drive mechanism and hold it there while carefully observing it. Type CATALOG .D2 again and press <Return>. Watch the drive cam for movement; you should **not** feel the pencil move. If the cam does move, replace the following devices (unless they have been replaced previously) one at a time, and repeat this test. If the analog card still fails to function properly, place all original ICs in their sockets and return the card to Apple. Otherwise, go on to the next step.

 IC at E2 (labelled 74LS74)
 IC at F1 (labelled 74LS32)

4. Remove the diskette from the external drive and re-insert it.

5. With the pencil eraser resting on the drive cam, type CATALOG .D2 and press <Return> and observe the cam for movement; you **should** feel the pencil move. If the cam does not move, replace the following devices (unless they have been replaced previously) one at a time, and repeat this test. If the analog card still fails to function properly, place all original ICs in their sockets and return the card to Apple. Otherwise, go on to the next step.

 IC at E2 (labelled 74LS74)
 IC at F1 (labelled 74LS32)

6. Repeat step 5 (above). This time, the cam should **not** move. If the cam moves, replace the following devices (unless they have been replaced previously) one at a time, and repeat this test. If the analog card still fails to function properly, place all original ICs in their sockets and return the card to Apple. Otherwise, go on to the next step.

 IC at E2 (labelled 74LS74)
 IC at F1 (labelled 74LS32)

7. Boot the *Apple II Emulation* diskette by placing it in the internal drive and turning on the power to the computer. The Emulation display will show on the video screen.

8. Remove the *Apple II Emulation* diskette and boot the *DOS 3.3 System Master* diskette by inserting it in the internal drive and pressing <Return>. Once it has booted, move it to the external drive.

9. Type CATALOG,D2 and press <Return>. After the catalog is displayed, press <Return>. the Applesoft prompt (]) will appear on the video screen.

10. Place the pencil eraser on the drive cam. Type CATALOG again and press <Return>. The cam should **not** move. If the cam moves, replace the following devices (unless they have been replaced previously) one at a time and repeat this test. If the analog card still fails to function properly, place all original ICs in their sockets and return the card to Apple.

 IC at E2 (labelled 74LS74)
 IC at F1 (labelled 74LS32)

11. Remove the *DOS 3.3 System Master* diskette from the external drive and replace it in the same drive. Repeat step 10 (above) and check that the cam does **not** move. If the cam moves, replace the following devices (unless they have been replaced previously) one at a time, and repeat this test. If the analog card still fails to function properly, place all original ICs in their sockets and return the card to Apple.

 IC at E2 (labelled 74LS74)
 IC at F1 (labelled 74LS32)

Apple Technical Procedures

Disk III

Section 3 – Adjustments

❑ CONTENTS

3.3 Introduction
3.3 DSPEED
3.3 Making the Adjustment
3.4 Write-Protect Switch
3.4 Making the Adjustment

Note: If a step is underlined, detailed instructions for that step can be found in Section 1, Take-Apart.

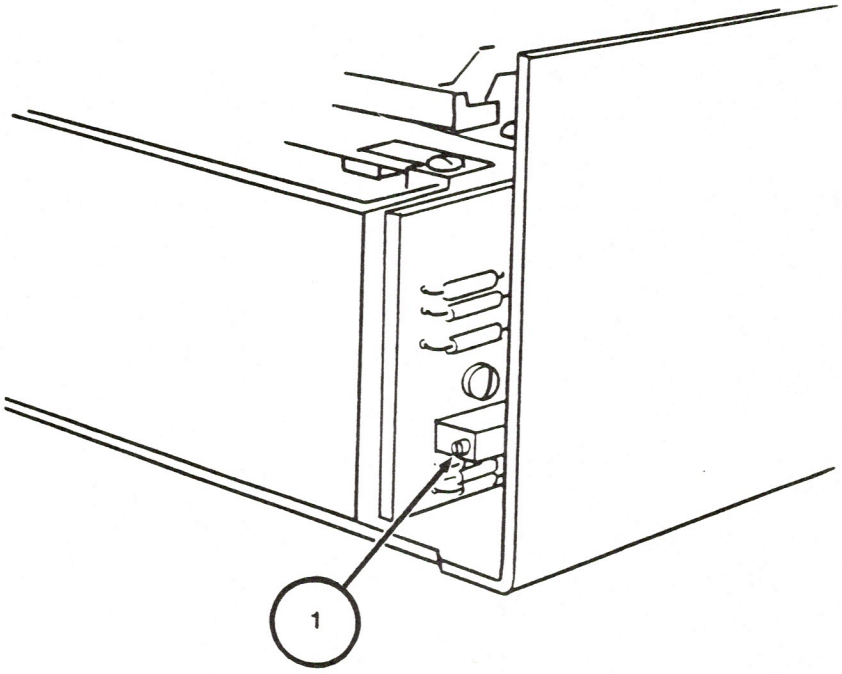


FIGURE 1

❑ INTRODUCTION

These adjustment procedures were written to be used with the *Apple 5.25-Inch Disk Drive Diagnostic*—if the test indicates that you need to adjust the drive speed or if the write-protect test fails. All information on setting up and running the diagnostic is in the *Disk Drives Technical Procedures*, Section 1, 5.25-Inch Disk Drive Diagnostic.

❑ DSPEED

Materials Required

Apple 5.25-Inch Disk Drive Diagnostic diskette
Disk Drives Technical Procedures manual
A small (jeweler's) flatblade screwdriver
Apple III with video display
The Disk III to be adjusted

Making the Adjustment

To adjust the DSPEED (drive motor speed):

1. Remove the case and shield.

2. Start the diagnostic running (see the *Disk Drives Technical Procedures*, Section 1, 5.25-Inch Disk Drive Diagnostic). The diagnostic should be placed in the external drive after it has been loaded from the internal drive.

3. Look at the back of the drive mechanism. Locate the motor control card, mounted on the rear, and locate the potentiometer which has a screwdriver adjustment on the side (Figure 1, #1). (Do not confuse this with the potentiometer(s) on the analog card!)

 Note: When you make the DSPEED adjustment, keep the disk drive flat.

4. The adjustment is extremely sensitive, so turn the adjustment screw very slowly. The drive motor speed indicator on the screen will move back and forth, showing changes of the speed.

5. Adjust the speed so that it stays within the "good" range, as close to 0 as possible. Let the test run for 30 seconds.

6. Press <Escape> to return to the main menu; then repeat the test.

 Does the DSPEED now stay within the "good" range?

 - Yes—Press <Escape> to return to the main menu.

 - No—If the DSPEED cannot be properly adjusted, return the faulty mechanical assembly to Apple.

7. Remove the Diagnostic diskette from the drive.

8. Replace the shield and case.

❑ WRITE-PROTECT SWITCH

Materials Required

Scratch diskette
Small flatblade screwdriver

Making the Adjustment

To adjust the write-protect switch:

1. Remove the case.

2. Start the diagnostic running (see the *Disk Drives Technical Procedures*, Section 1, 5.25-Inch Disk Drive Diagnostic), and run the "Write Protect" test.

3. Note the two setscrews holding the write-protect switch in place (Figure 2, #1 & 2). The switch is located on the front left side of the drive as you face the drive door. The far setscrew (Figure 2, #1) forms a pivot for the switch; the near setscrew (Figure 2, #2) sets the switch position.

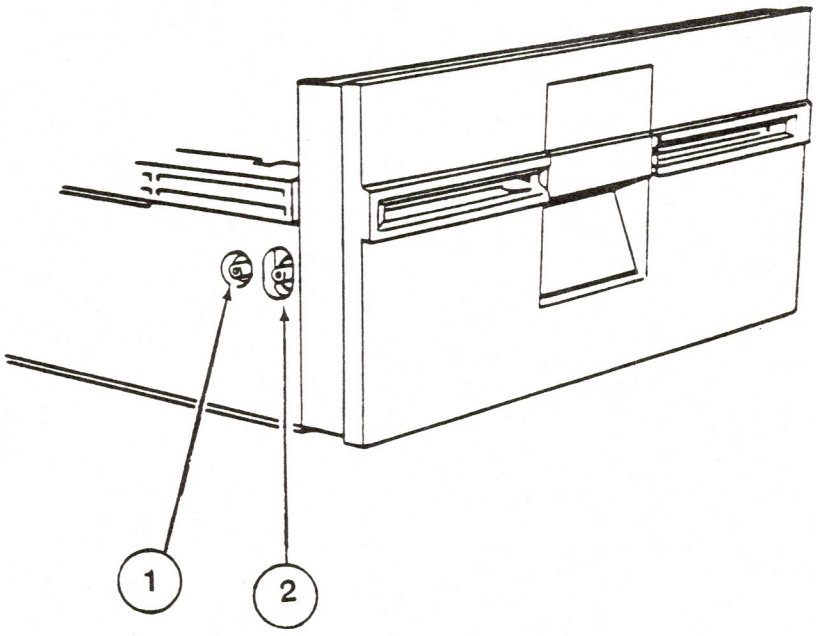


FIGURE 2

4. Insert the scratch diskette all the way and leave the disk drive door open.

5. Loosen the rear setscrew. Then loosen the front setscrew (Figure 2, #2), raise up on it until the switch disables, and tighten the setscrew.

6. Tighten the rear setscrew (Figure 2, #1).

7. Check the adjustment again by withdrawing the diskette approximately one-inch. The switch should be enabled.

 Note: If the switch continues to show a disabled condition, reboot and try the procedure again.

8. Verify the adjustment again by pushing the diskette fully into the disk drive and then withdrawing it approximately one inch. The condition should change from disabled to enabled.

Disk III

Section 4 – Preventive Maintenance

❑ CONTENTS

4.2	Introduction
4.2	Read/Write Head
4.3	Head Load Button
4.3	Motor Drive Belt

Note: If a step is underlined, detailed instructions for that step can be found in Section 1, Take-Apart.

❑ INTRODUCTION

The read/write head should be cleaned any time the computer or disk drive is being serviced. The head load button should be replaced whenever it is worn or dirty. The drive motor belt should be inspected any time the disk drive is being serviced.

❑ READ/WRITE HEAD

Materials Requried

#2 Phillips screwdriver
Cotton swabs
Isopropyl Alcohol (80% alcohol/20% water)

Procedure

To check the read/write head:

1. Remove the case, shield, and analog card.
2. Clean the guide rails with the isopropyl alcohol. **Do not** use grease.
3. Inspect the head for worn or dull spots in the ceramic. If you find any, replace the mechanical assembly.
4. Clean the head with the isopropyl alcohol.
5. Move the read/write head assembly back and fourth along the full length of its travel. Check for any blockage or friction. If there is any, replace the mechanical assembly.
6. Replace the analog card, shield, and case.

❑ HEAD LOAD BUTTON

Materials Required

#2 Phillips screwdriver
Needlenose pliers
Head load button

Procedure

To service the head load button:

1. Remove the case, the analog card, and the mechanical assembly.

2. Lift up the Head Load Arm. If the head load button is worn or dirty, squeeze the top part of the load button with thin needlenose pliers, and drop the button down.

 Note: Some head load buttons are glued. If the glue cannot be broken, send the mechanical assembly to Apple for servicing.

3. Install a new load button by inserting it into the holder and pushing up until it snaps into place.

❑ MOTOR DRIVE BELT

Materials Required

#2 Phillips screwdriver
Motor drive belt

Procedure

1. Remove the case.

2. Turn the drive upside down. Locate the motor drive belt and check it for cracks, slippage, and elasticity. If the belt is dry or cracked, or if it slips, continue with step 3.

3. Slip the belt off the pulley.

4. Place the belt around the motor spindle and then slip it around the pulley.

5. Replace the case.

Apple Technical Procedures

Disk III

Section 5 – Illustrated Parts List

❑ CONTENTS

5.3 Complete Assembly (Figure 1)
5.5 Internal Parts (Figure 2)
5.7 Analog Card (Figure 3)

The figures and lists in this section include all piece parts that can be purchased separately from Apple for the Disk III, along with their part numbers. These are the only parts available from Apple. Refer to your *Apple Service Programs Manual* for prices.

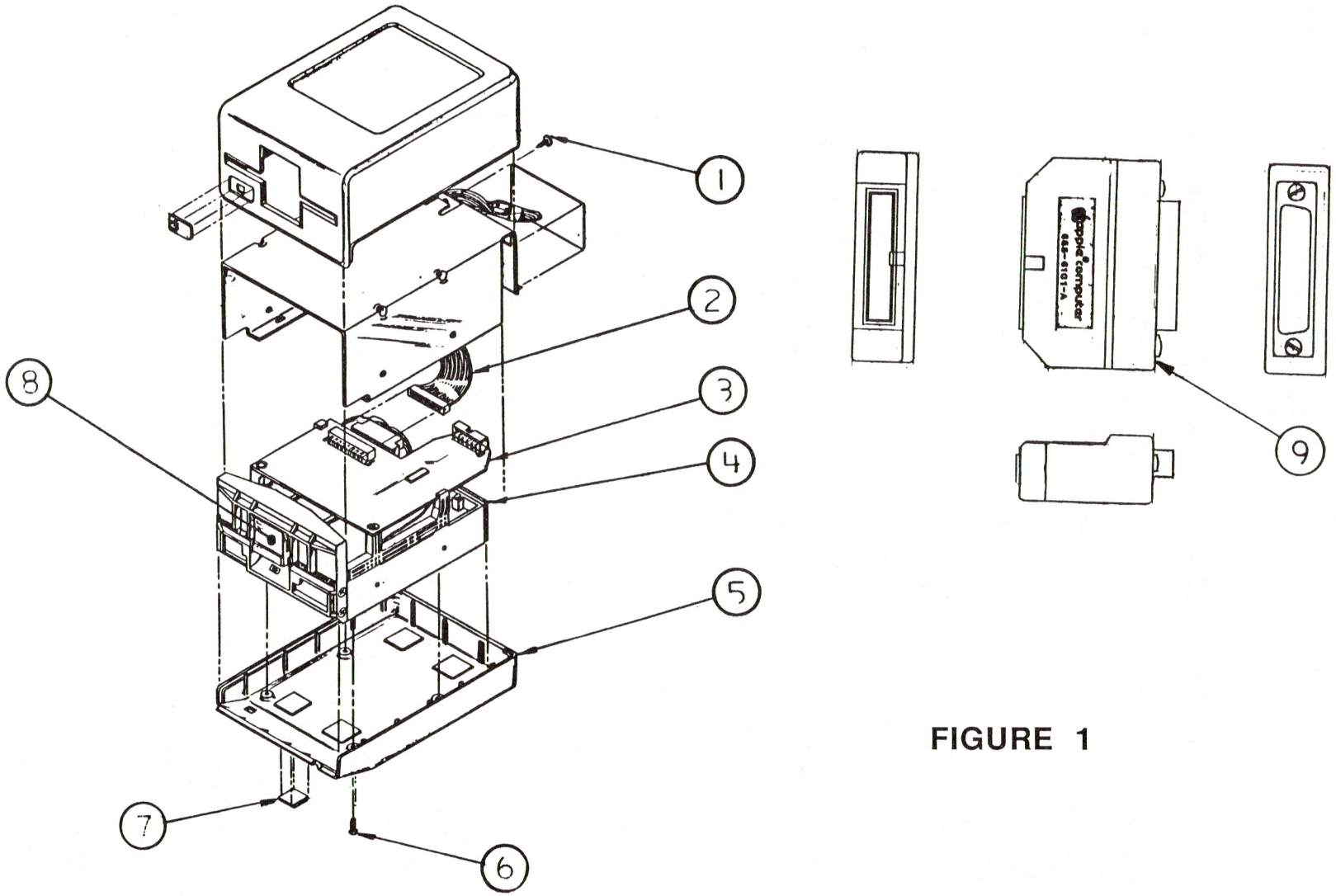
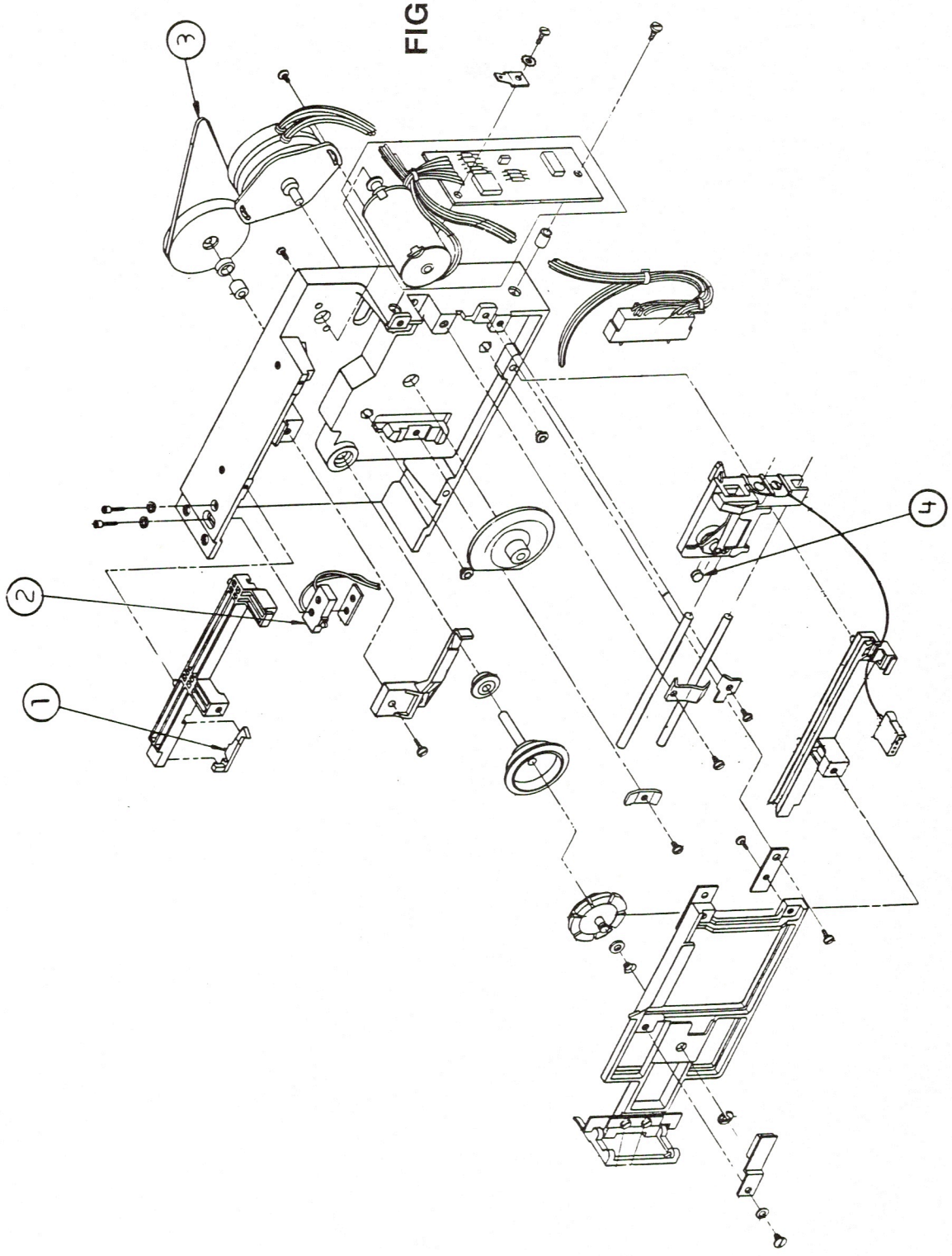


FIGURE 1

❑ DISK III – COMPLETE ASSEMBLY (Figure 1)

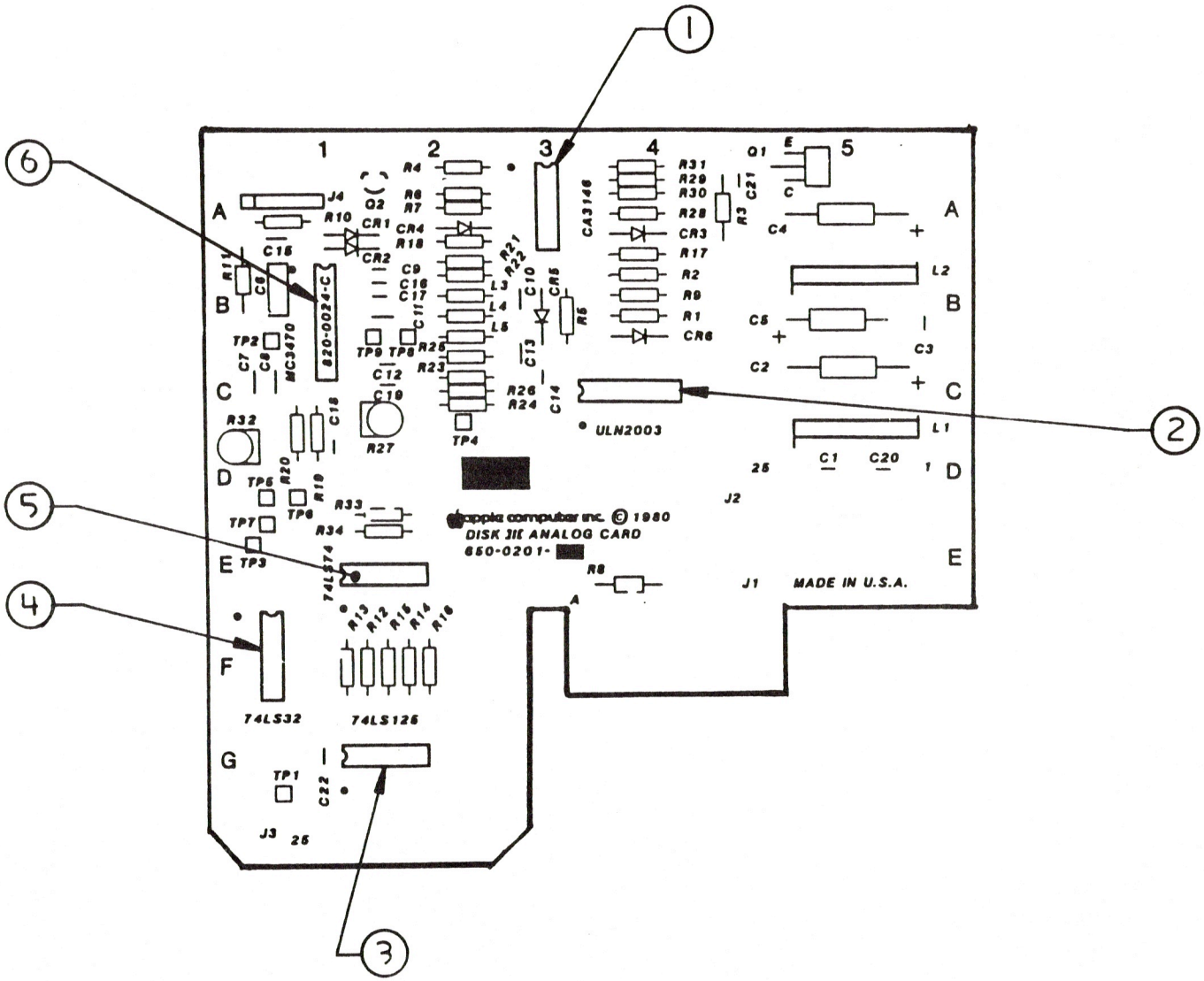
Item	Part No.	Description
1	430-1001	Screw, Tapping, 8 x 18.437, Disk III
2	590-0024	Disk III Cable
3	661-92002	Disk III Analog Card
4	661-92015	Disk III Mechanical Assembly, External
5	815-0186	Disk III Bottom Cover
6	400-1606	Screw, 6-32 x 3/8, Disk III
7	865-0001	Rubber Foot
8	815-0187	Disk III Door
9	655-6101	PCB Adapter Assembly, Disk III/Apple III Plus

FIGURE 2



❑ DISK III – INTERNAL PARTS (Figure 2)

Item	Part No.	Description
1	815-0377	Write Protect Actuator (Alps)
	U815-0073	Write Protect Actuator (Shugart)
2	U705-0005	Write Protect Switch, Disk II/III
3	U880-0002	Disk Drive Belt
4	U815-0064	Load Button


1
2
3
4
5
6
apple computer inc. © 1980
DISK III ANALOG CARD
650-0201-
MADE IN U.S.A.
ULN2003
74LS32
74LS125
74LS74
MC3470
CA3146
820-0024-C

❑ DISK III – ANALOG CARD (Figure 3)

Item	Part No.	Description
1	352-3146	IC 3146
2	327-2003	IC 2003A
3	306-0125	IC 74LS125
4	305-0032	IC 74LS32
5	305-0074	IC 74LS74
6	355-3470	IC MC3470

Profile

PROFILE TECHNICAL PROCEDURES

TABLE OF CONTENTS

Section 1 - Apple IIe ProFile Limited Data Recovery Program, Version 2.0

Introduction.....1.3
What You Should Do First.....1.3
Software Overview.....1.3
Equipment Required.....1.4
Setting Up the System.....1.4
Running the Program.....1.5
Interpreting the Results.....1.8

Section 2 - ProFile Troubleshooting and Exchange Procedures

Introduction.....2.2
Troubleshooting
 Materials Required.....2.3
 Using the Troubleshooting Flowchart.....2.4
 Troubleshooting Flowchart.....2.5
 ProFile Functional Test.....2.6
Exchanging the ProFile
 Materials Required.....2.7
 Unpacking the Exchange Module.....2.7
 Removing the Cover.....2.9
 Replacing the Cover and Rear Plates.....2.9
Summary of Procedures (Checklist).....2.10

©Apple Computer, Inc., 1985, 1986
No part of this document may be reproduced in any form without the written permission of Apple Computer, Inc.

Macintosh is a trademark of McIntosh Laboratory, Inc., and is used by Apple Computer, Inc., with its express permission. ProFile is a trademark of Apple Computer, Inc. ProDOS, Lisa, Apple and the Apple logo are registered trademarks of Apple Computer, Inc.

Section 3 - Illustrated Parts Lists

Cables.....3.3
Piece Parts.....3.5
Miscellaneous Parts.....3.7
Packaging.....3.9

Appendix - A

ProFile Packaging for Shipment.....A.1

ProFile Technical Procedures

Section 1

Apple IIe ProFile Limited Data Recovery Program, Version 2.0

Contents:

Introduction.....1.3
What You Should Do First.....1.3
Software Overview.....1.3
Equipment Required.....1.4
Setting Up the System.....1.4
Running the Program.....1.5
Interpreting the Results.....1.8

A. INTRODUCTION

The ProFile 5/10 Limited Data Recovery Program runs on a 128K Apple IIe system and can be used to recover data stored on a ProFile that has been used with any computer from the Apple II or Apple /// families. It works with DOS and ProDOS based file structures and therefore, will not recover or recognize MacWorks or Lisa based ProFiles. The recovery program attempts to copy customer's files from a damaged ProFile to the exchange unit. Although there is no guarantee that data can be transferred, in most cases data recovery is possible if the ProFile passes the self test after being turned on.

NOTE: Data can only be transferred to a Profile with a storage capacity as great or greater than the damaged Profile. (You cannot, for example, transfer data from a 10 megabyte damaged Profile to a 5 megabyte good Profile -- there would not be enough room for all the data.)

If the ProFile READY light does not come on to a steady state within 24 hours, data cannot be recovered using this program. Special arrangements must then be made with Level 2 for data recovery.

The importance of regular backups should be emphasized to the customer.

B. WHAT YOU SHOULD DO FIRST

First, make a back-up copy of the Recovery Program diskette! You will be using a system with known bad hardware attached to it, so don't take the chance of destroying the software accidentally. You may make a copy of the program using the COPYA program on the DOS System Master diskette, or the ProDOS Filer, Volume Copy. Put the original away in a safe place.

C. SOFTWARE OVERVIEW

The program is designed to recover a large portion of data found on a damaged ProFile. In order to use this program the customer's ProFile must complete the power-up cycle, which includes a testing sequence. That is, the red "READY" indicator must be on and steady. If this does not occur, data recovery is not possible. (If the source/bad ProFile has difficulty completing the power-up cycle, leave it on for 24 hours. If left on long enough, most ProFiles warm up enough to complete the cycle.)

The program copies data from the customer's ProFile to the exchange unit. If the program has difficulty writing to the Exchange ProFile, it should stop. Something could be wrong with the Exchange unit, so try another Exchange unit. The program verifies the integrity of the destination (Exchange) ProFile, does a direct block transfer from source (bad) to destination (good), then manipulates the destination data to rebuild file and directory structures. The program does not modify the source (bad) ProFile in any way.

As the program proceeds, those blocks which the program has problems reading are identified. At the conclusion of the data transfer, the program examines each file to see if any of its blocks were among those which couldn't be copied. A printed record indicates the uncopied files as being suspect and, most probably, unusable. While this is going on, the master allocation map for the entire ProFile is also being rebuilt. The allocation map tells which blocks are used and which are free for use.

Our testing has shown that the program is able to recover most of the data from those ProFiles that become "READY".

D. EQUIPMENT REQUIRED

Apple IIe System (128k)
Monitor
Compatible Printer (optional)
Printer Interface Card installed in slot 1 (optional)
ProFile Interface Card (2 required)
ProFile Interface Cable (2 required)

E. SETTING UP THE SYSTEM

1. Turn the power off on the Apple IIe and remove the cover.

2. If you wish a printout of the results, install a correctly configured interface card for the desired printer in slot 1.

3. Configure the Apple IIe with two ProFiles as follows: Install the ProFile interface cards in any two slots other than slots 3 or 6. Seat the cards firmly in the slots.

4. Connect ProFile cables from the ProFiles to the ProFile interface cards. If setting up a printer, use the printer cable to connect the printer to the printer interface card.

5. Connect the monitor, ProFiles, and printer (if used) to the power source.

F. RUNNING THE PROGRAM

1. Turn on the monitor.

2. If using a printer, turn it on and make sure it is on-line.

3. Place the Recovery Program Diskette in the Apple IIe disk drive.

4. Turn on the Apple IIe and the program will start.

5. Turn on both ProFiles.

6. **Wait** until the "READY" lights on both ProFiles show steady red. This usually takes only a minute or so, but can take up to 24 hours for a bad ProFile. If the source/bad ProFile has some difficulty completing the power-up cycle and testing sequence, leave the ProFile on at least 24 hours, if at all possible. (If left on long enough, ProFiles sometimes warm up enough to complete the cycle.)

7. **NOTE:** The program has help screens throughout. To access them, hold down the **OPEN-APPLE** key while typing **?** (remember to shift for the **?**). These screens clarify what the program is requesting. Use them if you become confused while running the program. The steps which follow will make no reference to the help screens.

8. When the program starts you will see the Title Page message below:

This program will attempt to recover data from a 5 or 10 megabyte hard disk and save the data to another 5 or 10 megabyte hard disk.

Before running this program you must have a source (bad) and destination (good) drive connected and turned on.

9. Check to see that you have connected the ProFiles and that they are in the READY state.

 Press <RETURN>. The screen now displays the following message:

If you have a printer connected in slot 1, the program can make hard copies of the names of files transferred and results of the data recovery.

If you wish a printed report, make sure that the printer is connected, turned on, and correctly configured or the program will not continue.

Do you want a printed report (Y/N)?

10. This message indicates that if are going to respond to this prompt with Y (you wish a printed report), the printer must be correctly configured and on-line, or the program will hang when it attempts to send information to the printer.

 Respond to the prompt with Y or N and press <RETURN>.

 The screen now displays the following information:

The following hard disk drives are attached to this system

__ megabyte hard disk drive in slot __

__ megabyte hard disk drive in slot __

Enter the slot number that corresponds to the source/bad hard disk drive you want to recover data FROM, then press RETURN.

11. Enter the slot number of the bad drive (the one you want to recover information from) and press <RETURN>.

 A verify screen appears showing which are the source and destination hard disk drives and how many megabytes of storage capacity each has. There is a warning that any information on the destination/good drive will be erased by the data that will be transferred to it. You are asked if the good and bad drives are identified correctly.

12. Check to see that the drives are identified correctly. Then, execute one of the following three options.

 Enter Y or Yes if the disk drives are identified correctly. The program will continue.

 Enter N or No if the drives are NOT correct. You can then type in the correct slot numbers.

 Press ESC to restart the program. The program will go to the title page.

 The final verify screen is now displayed. This is your final chance to be sure that the ProFiles are correctly designated.

13. Verify that the ProFiles are correctly designated source/bad and destination/good.

 Type in RECOVER.

 The status screen is now displayed:

This program is recovering data from the source/bad
__ megabyte disk drive connected to slot 5

And copying the recoverable data to the destination good
__ megabyte hard disk drive.

Verifying internal data structures
Processing block number _____ of 19456 total blocks
or, (occasionally):
Rebuilding file number _____

 During the operation of the program, different messages will appear on the screen to let you know what is happening within the program. The recovery procedure will take up to 40 minutes, depending upon how much data can be recovered, and what problems are encountered.

 The Exit screen tells you when the recovery is complete.

14. On completion of the program, messages will be listed to the printer. (You may verify file transfer by rebooting with the ProDOS Filer diskette and listing the files.)

15. Power down both ProFiles. The exchange unit goes to the customer, and the other unit goes to Level 2.

16. Turn the other equipment off, remove the program diskette and put it away in a safe place.

G. INTERPRETING THE RESULTS

Give your customer the printed results of the data recovery procedures and a copy of how to interpret these results. In the following explanation, examples of the printout are shown in bold face printing. These statements are interpreted as follows:

Apple IIe Hard Disk Limited Data Recovery **Version 2.0**
Results:
Trouble accessing **0 blocks** (a number other than 0 might appear)

All accessible directories are listed below. Individual files which contain problem blocks are also listed.

The resolution of the individual files on the ProFile is shown as a running status, displaying the directory names as they appear on the ProFile. If a file contains one or more "suspect" blocks, its name will appear.

These files are not deleted as they may, in fact, still be partially usable. An example of this would be an ASCII file, such as one created by AppleWriter. An attempt should be made by the customer to access these files. If the attempt results in "unusual" things happening, then delete them.

Block Conflict Report

This message appears if two or more files claim use of the same block. Another pass through the ProFile directories is made to resolve it. Along with this message the directory names are listed on the print-out. Those files which conflict with each other will be listed.

An attempt is made to resolve the disputed block address. If the conflict is resolved, no further mention is made of the files. If the program is unable to decide the correct ownership of the block, the following message appears: **Unable to repair all block conflict errors. Try your files.** This indicates that the files have not been copied to the good ProFile. On conclusion of the program, use the ProDOS Filer program to attempt to copy the conflicting files from the bad source ProFile to the good Profile or to a diskette. The address conflict will be resolved in the copy process.

Summary of Allocation Map Changes

This summarizes the changes made to the master allocation map. This will include the total number of blocks available on the ProFile (**blocks on volume**), the number of blocks in use (**blocks used**), and the number still available (**blocks available**).

Block(s) released from allocation map

A statement will also appear regarding the number of blocks, if any, released from the allocation map. If blocks were released, the original allocation map "thought" that more blocks were in use than really were. The ProFile returned to your customer contains the updated, correct allocation map.

ProFile Technical Procedures

Section 2

ProFile Troubleshooting and Exchange Procedures

Contents:

Introduction.....2.2
Troubleshooting
 Materials Required.....2.3
 Using the Troubleshooting Flowchart.....2.4
 Troubleshooting Flowchart.....2.5
 ProFile Functional Test.....2.6
Exchanging the ProFile
 Materials Required.....2.7
 Unpacking the Exchange Module.....2.7
 Removing the Cover.....2.9
 Replacing the Cover and Rear Plates.....2.9
Summary of Procedures (Checklist).....2.10

Refer to the Lisa/Macintosh XL Technical Procedures for repairing ProFiles used with a Lisa®/Macintosh™ XL computer.

INTRODUCTION

When a customer returns a ProFile™ 5 or 10 megabyte hard disk drive for servicing, the unit will need to be exchanged **if the ProFile itself is defective.** However, there are two other possible causes of ProFile problems: 1) bad interface cards or cables, or 2) a sudden bump or power outage to the ProFile while data was being read or written. The troubleshooting procedures in this section will allow you to check for these problems and to perform a functional test to determine whether the ProFile itself is defective or not.

If the customer wishes to try to recover data from the old ProFile, run the Limited Data Recovery program (described in **Section 1**) and record the data onto your exchange unit. If data recovery is successful, the ProFile itself is probably not defective: the problem was probably caused by a bump or a power outage during data access.

If the troubleshooting procedures show that the ProFile is defective, turn to the exchange procedures included in this section. If the ProFile is not defective give it back to the customer (after restoring the recovered data).

TROUBLESHOOTING

Materials Required

FOR APPLE II OR IIe

Known Good	Customer's
Apple II or IIe	ProFile Interface Card
ProFile Interface Card	Interface Cable
Interface Cable	ProFile
ProFile	
ProDOS User's Diskette	

Refer to **Apple IIe Service Notes** for important information about the Interface Card.

FOR APPLE /// OR /// PLUS

Known Good	Customer's
Apple /// or /// Plus	ProFile Interface Card
ProFile Interface Card	Interface Cable
Interface Cable	ProFile
ProFile	
System Utilities diskette	

Refer to **Apple /// Troubleshooting** for important information about the Interface Card.

Using the Troubleshooting Flowchart

CAUTION: Always wait until the ready light on the ProFile is steady before turning the ProFile off. Always turn off the computer and the ProFile before exchanging any item.

The Troubleshooting Flowchart is used to determine if the ProFile is the defective item.

The flowchart consists of rectangles and diamonds. The rectangles contain instructions to be followed. The diamonds contain questions which must be answered to determine the path by which to leave them. Always follow the flowchart through to the end to check the system completely.

If a rectangle contains more than one instruction, follow the first instruction and then leave the rectangle to continue through the flowchart. If the first instruction does not fix the problem, the chart will return you to the rectangle so that you can follow the second instruction, and so on.

IMPORTANT: If replacing an item does not solve the problem, make sure you put the original item back in place before replacing the next item recommended.

Here's What to Do:

1. Set up the appropriate **KNOWN GOOD** computer. Do not turn on the computer.

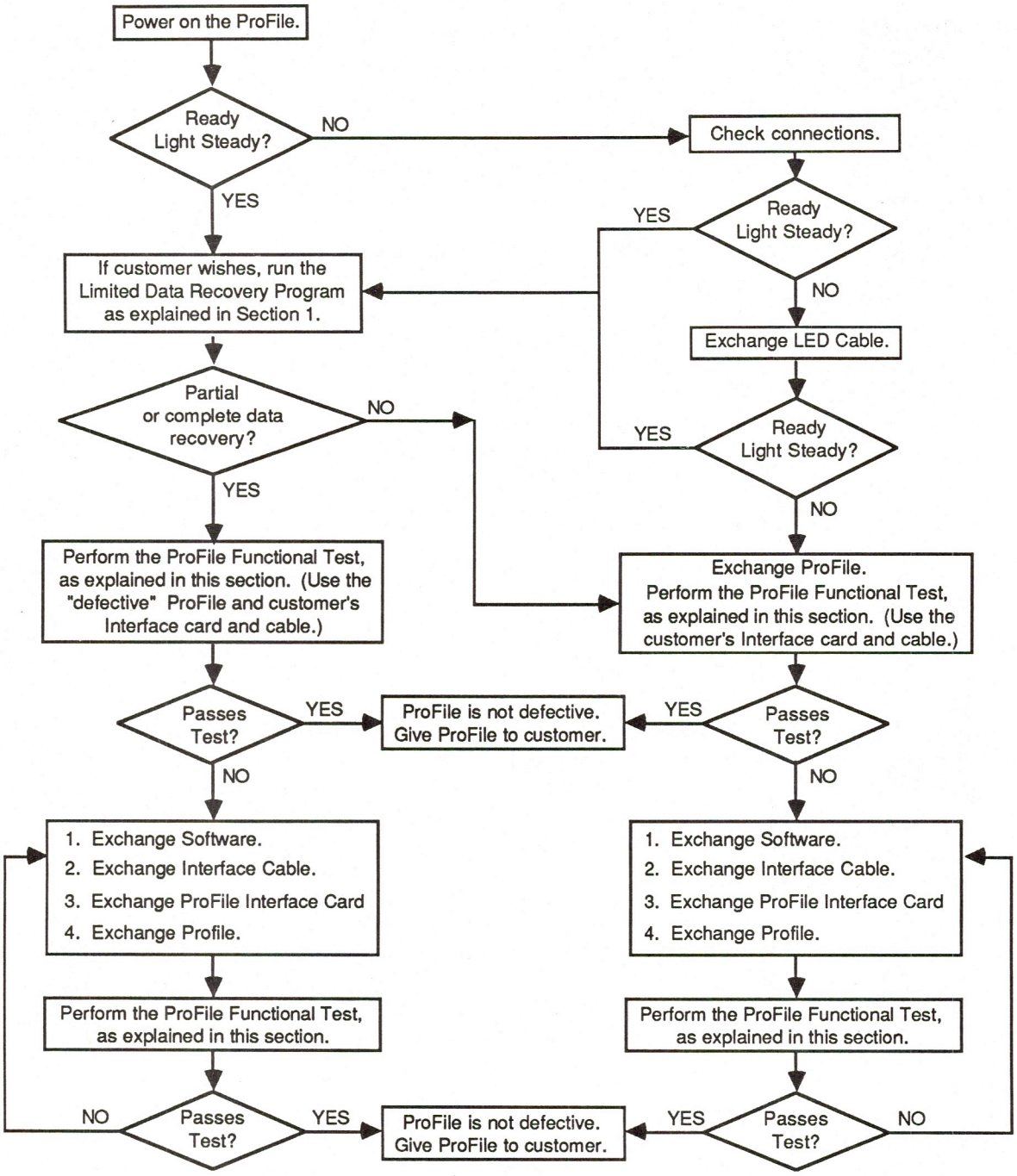
2. Connect the customer's ProFile. Use the customer's ProFile Interface Card and Interface Cable. Be sure all cable connections are secure.

3. Go to the **Troubleshooting Flowchart.** Start with the rectangle **Power on the ProFile.**

 The ProFile will take 1 to 6 minutes to come up to the ready state. The ready state is identified by the LED being on steadily, with no flashing.

4. Follow the flowchart through to the end.

TROUBLESHOOTING FLOWCHART



ProFile Functional Test

This procedure allows you to determine whether the customer's ProFile is really defective or not.

IMPORTANT: A ProFile contains 32 blocks which are **NOT ALLOCATED** (or accessed) unless a data block is bad. If a data block is bad, the ProFile writes to one of these normally inaccessible blocks. If the functional test shows that the ProFile has 21 bad blocks or fewer, the ProFile is considered functional and should not be returned for exchange.

1. In this test, use the customer's interface card and cable if possible. Otherwise use a known-good interface card and cable.

 Using the ProDOS User's Diskette (IIe) or System Utilities diskette (///):

 a. Reformat the customer's ProFile.

 b. Verify the volume two or three times. **No more than 21 Bad Blocks** should be displayed each time. (Verification of the ProFile takes approximately 4 to 8 minutes.)

 c. Write and read to the ProFile to verify that it is functioning correctly.

2. If you were able to complete all of step 1 successfully on the customer's ProFile, copy the customer's files from the exchange ProFile back onto the customer's ProFile and return the exchange ProFile to your service stock. Give the customer his ProFile.

 OR

 If the customer's ProFile does not meet the specified criterion in step 1b, give the customer the exchange ProFile, with his recovered data, and perform step 1b **ONLY** to check the exchange ProFile. **DO NOT REFORMAT**.

EXCHANGING THE PROFILE

Materials Required

Medium Phillips screwdriver
Protective pad

Unpacking the Exchange Module

1. Carefully remove the exchange module from its packaging.

2. A ProFile cover marked "SHIPPING FIXTURE" is attached to the spares kit ProFile. Remove this cover from the ProFile.

3. Verify that all modules are present, all connections are proper, and that there are no loose or broken wires or foreign materials.

4. Keep the cover and shipping materials for use later.

CAUTION: The ProFile is a mechanical device with motors and moving parts. Rough handling -- such as dropping the drive, sharply jarring it, or allowing heavy objects to fall on it -- can cause a malfunction. Whenever it is necessary to turn the ProFile over, be sure to rest it on a protective pad.

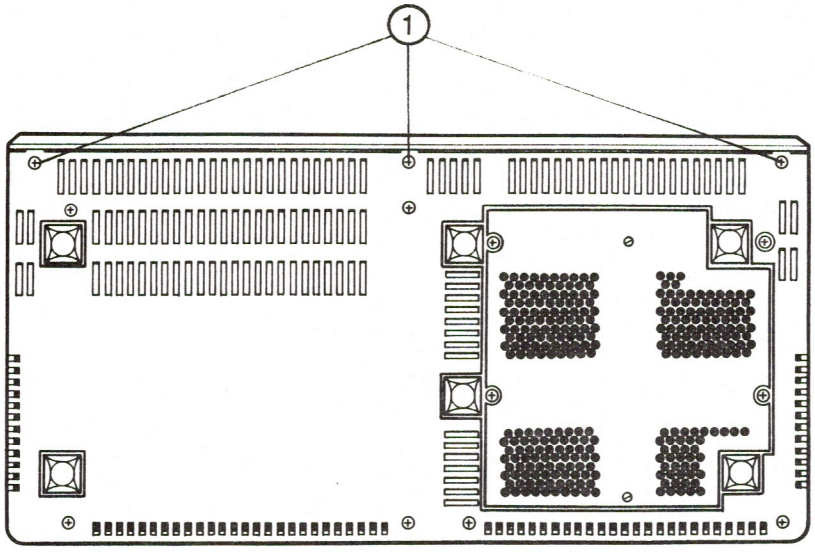


FIGURE 1

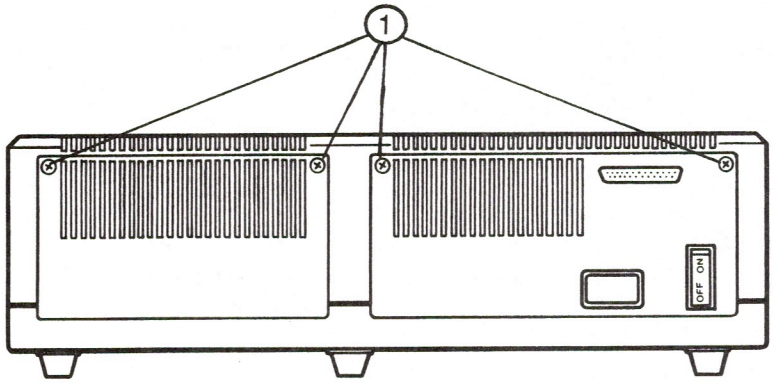


FIGURE 2

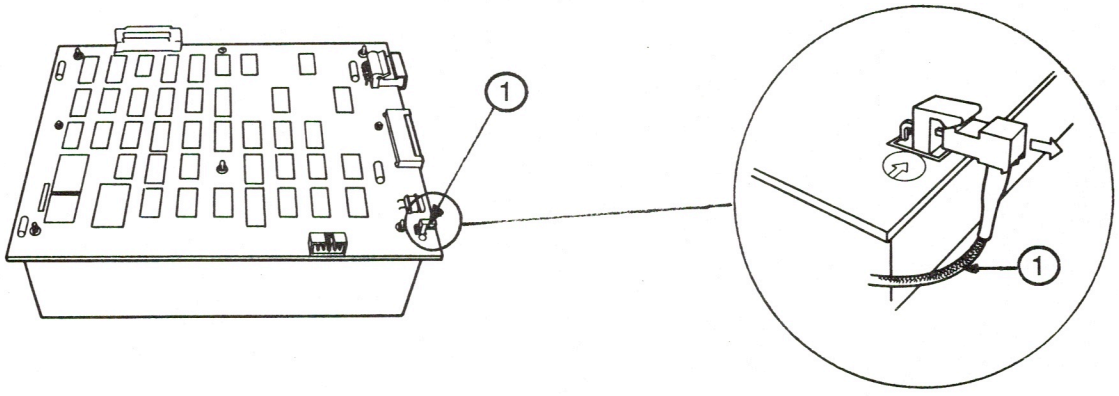


FIGURE 3

FIGURE 4

Removing the Cover

1. Be sure the customer's ProFile is turned off. Disconnect the power cord and ribbon cable from the rear of the ProFile.

2. Turn the ProFile over, lay it on the protective pad, and remove the three Phillips-head screws from under the front panel (Figure 1, #1).

3. Turn the ProFile right side up; remove the four screws from the two plates on its back (Figure 2, #1).

4. Lift the cover off carefully and rest it on the far side of the case, taking care not to pull on the LED cable.

5. Unplug the LED cable from its socket on the controller board (Figures 3 and 4, #1).

Replacing the Cover and Rear Plates

1. Attach the customer's LED cable to its connector on the controller card of the exchange unit (Figure 3, #1). Make sure the LED cable exits down and away from the card (Figure 4, #1).

2. Attach the customer's two rear plates to the exchange unit using the four screws. Do not tighten the screws at this time (Figure 2, #1). **NOTE:** The serial number is stamped on one of the rear plates and must be transferred to the ProFile which the customer will keep.

3. Place the customer's ProFile cover onto the exchange module. (Hint: The four slots on the back of the cover fit between the inner and outer rear plates. Line up the back first; then pull the cover gently forward and down. Check around the cover to make sure the LED cable isn't caught between the cover and the base.)

4. Tighten the four rear-plate screws.

5. Turn the ProFile over and replace the three screws on the bottom front edge (Figure 1, #1).

6. Turn the ProFile right side up. Reinstall the power cord and ribbon cable.

7. Attach the ProFile cover marked "SHIPPING FIXTURE" to the unit to be returned for servicing.

SUMMARY OF PROCEDURES (CHECKLIST)

When a customer brings in a non-working ProFile, follow the steps outlined below.

Run the Limited Data Recovery program with an Apple IIe:

___ Turn on monitor and printer; be sure printer is on-line.

___ Connect exchange ProFile (use slot 3 for the known good Interface card).

___ Connect customer's ProFile (use slot 4 for the known good Interface card).

___ Turn on Apple IIe and run the Limited Data Recovery program (see Section 1 under this tab).

___ Power down and disconnect both ProFiles.

___ Check whether the customer's ProFile is defective by performing the ProFile Functional Test procedures. If the customer's ProFle is not defective, return to the customer or service stock.

If the customer's ProFile is defective, replace with the exchange ProFile.

___ Remove both rear plates from the customer's ProFile.

___ Remove the cover from the customer's ProFile.

___ Unplug the LED cables from the controller cards of both ProFiles. Attach the customer's LED cable to the appropriate connector on the controller card of the exchange ProFile.

___ Transfer the two rear plates from the customer's ProFile onto the exchange ProFile. Note that the serial number is on one of these plates.

___ Attach the customer's cover to the exchange ProFile, fitting it into place over the two rear plates.

___ Transfer the ProFile cover marked "SHIPPING FIXTURE" onto the unit to be repaired.

___ Pack the repair unit in one of the approved packagings (see **Appendix A**).

___ Complete all shipping documentation.

ProFile Technical Procedures

Section 3

Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the ProFile, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

NOTE: For ProFile interface cards for Apple II/II+, Apple IIe and Apple ///, see parts list section for appropriate computer.

Contents:

Cables.....3.3
Piece Parts.....3.5
Miscellaneous Parts.....3.7
Packaging.....3.9

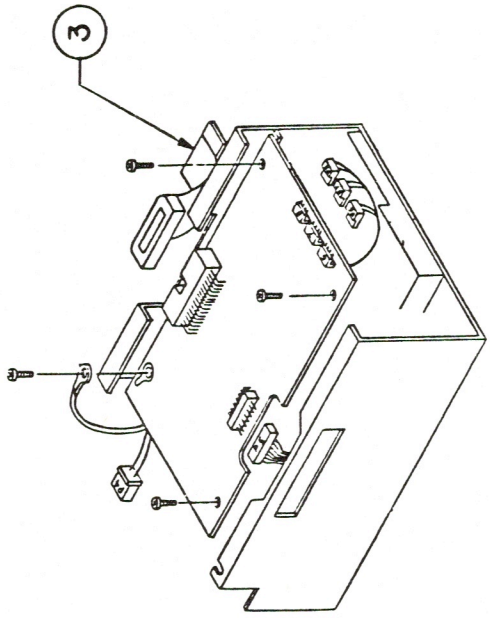
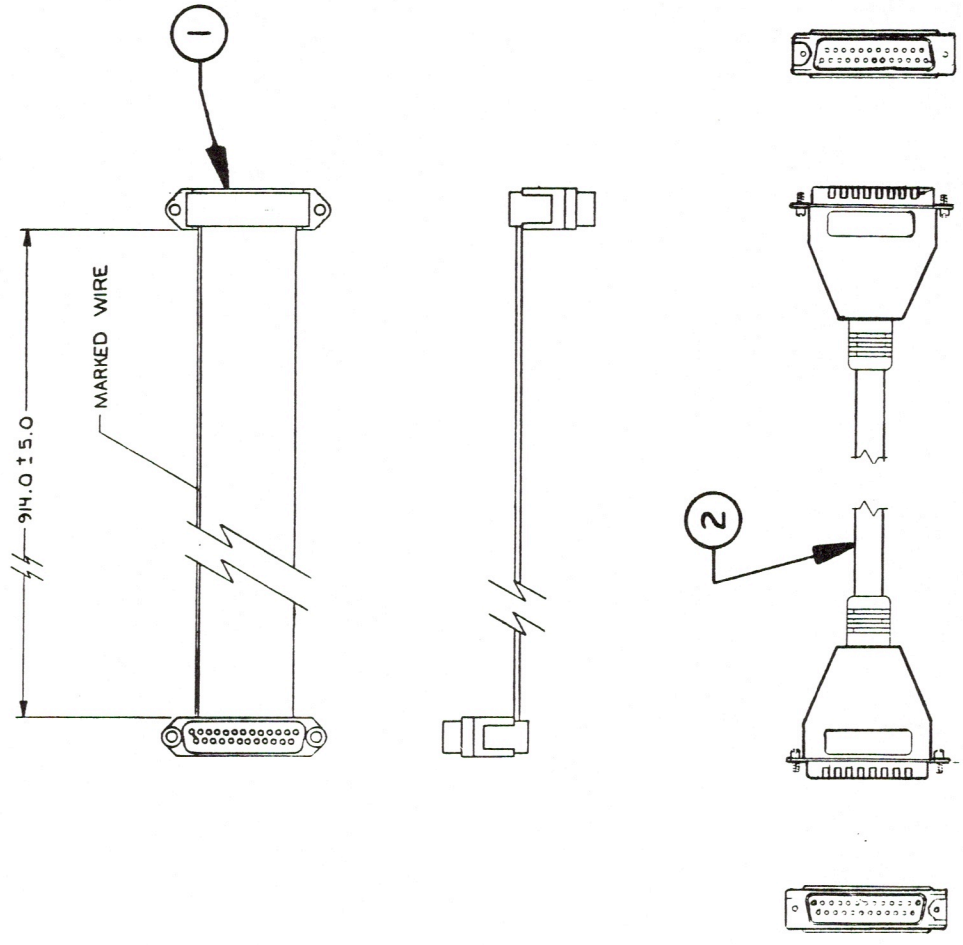


FIGURE 1



PROFILE - CABLES (Figure 1)

Item	Part No.	Description
1	590-0046	Cable I/O
2	590-0202	Cable, External
3	590-0048	Cable, Controller to Analog

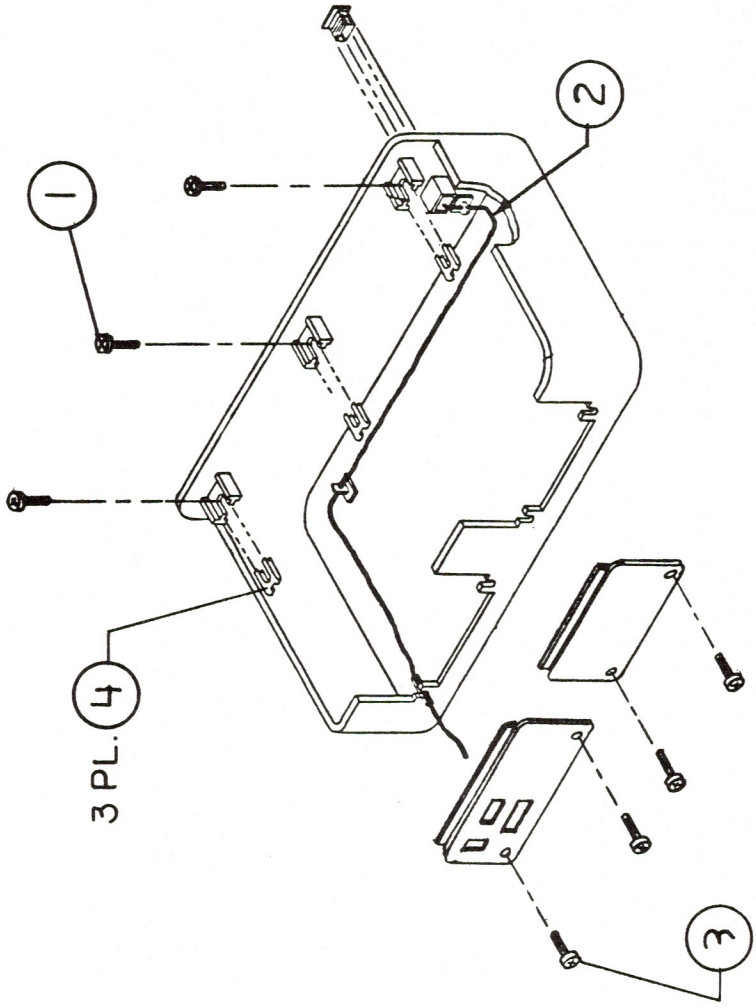


FIGURE 2

PROFILE - PIECE PARTS (Figure 2)

Item	Part No.	Description
1	430-1001	Screw, Tapping, 8-18 x 0.437 PN CRS
2	590-0047	Cable LED
3	403-1606	Screw, 6-32 x 3/8 Panhead
4	835-0005	Nut Speed "J"

FIGURE 3

PROFILE - MISCELLANEOUS PARTS (Figure 3)

Item	Part No.	Description
1	860-0200	Standoff Plastic
2	865-0005	Foot, .52HT SQ

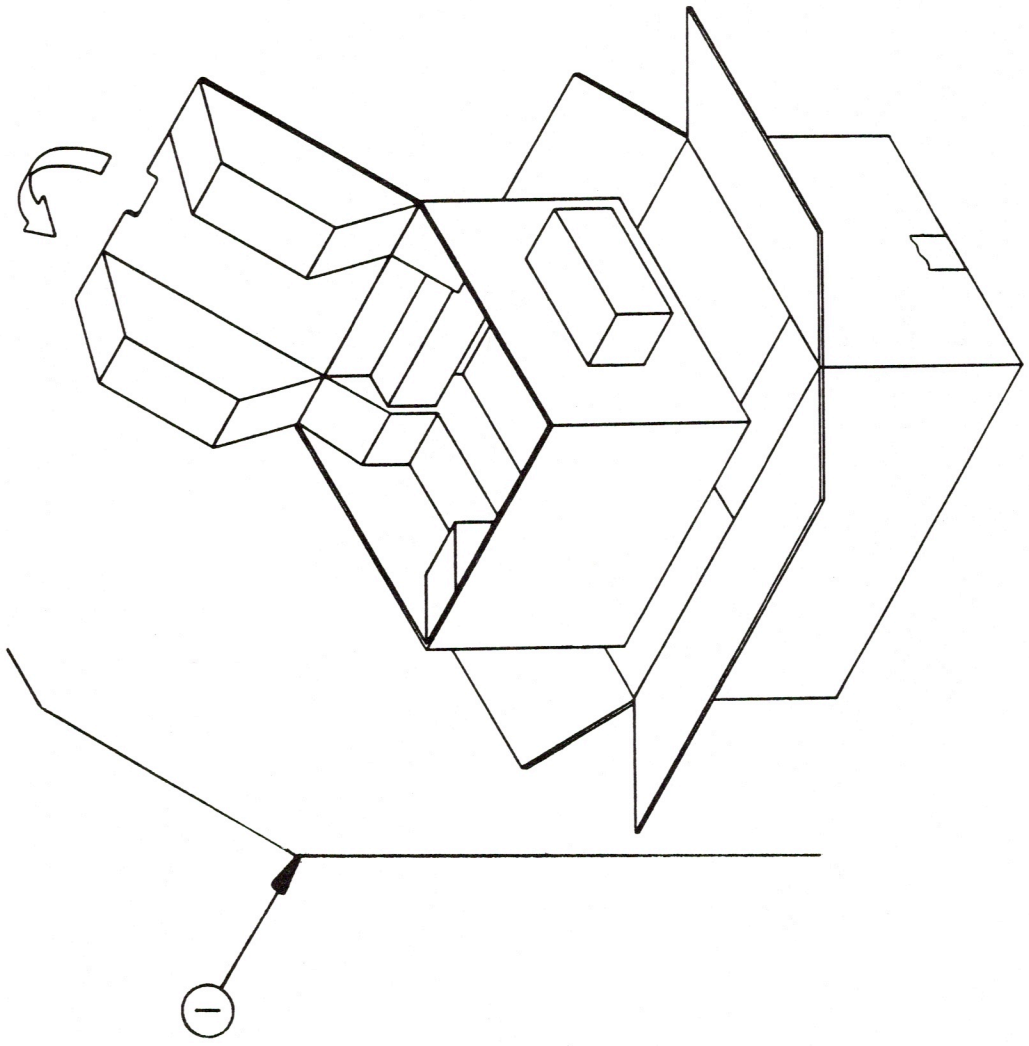


FIGURE 4

PROFILE - PACKAGING (Figure 4)

Item	Part No.	Description
1	602-0129	ProFile Packaging

ProFile Technical Procedures

Appendix A

ProFile Packaging for Shipment

PACKAGING FOR SHIPMENT

There are two different Apple-approved shipping packages available for the ProFile. When returning a ProFile, one of the approved packages must be used.

New Style

The new packaging is smaller and easier to use (see Figure 1).

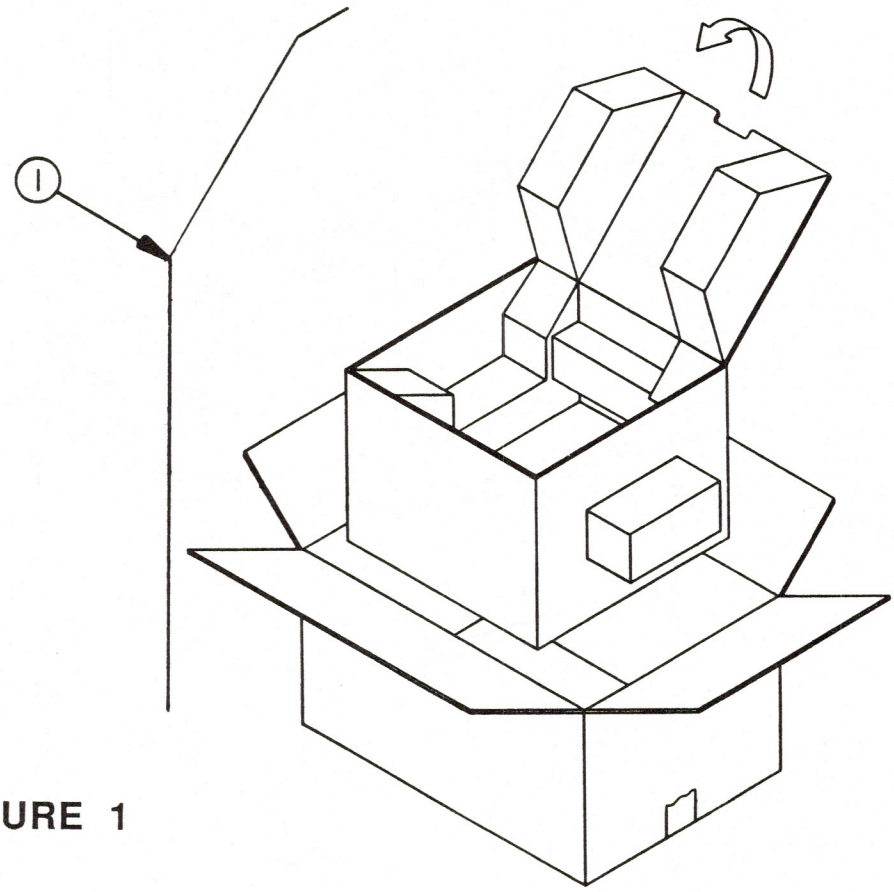


FIGURE 1

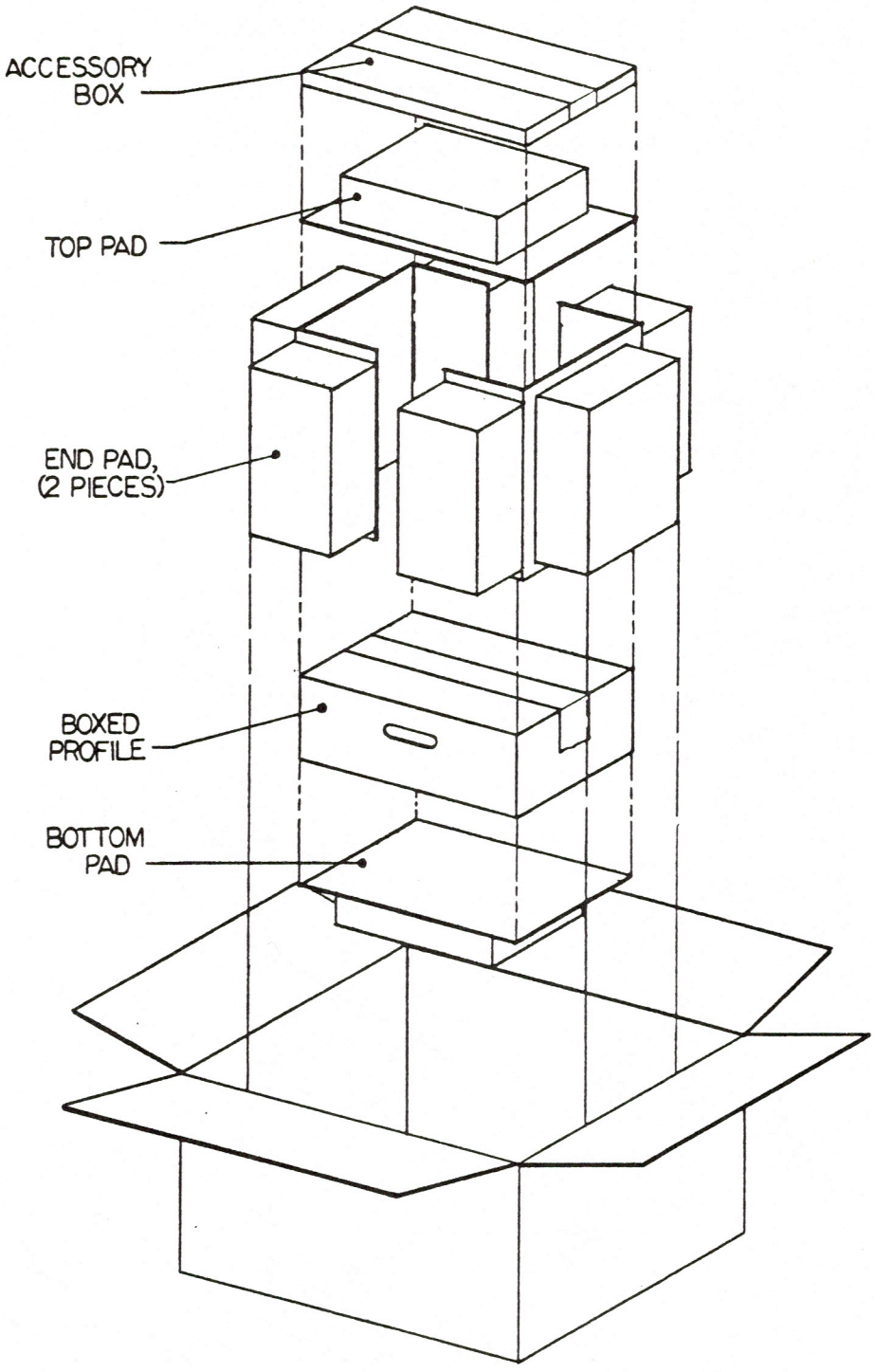

ACCESSORY BOX
TOP PAD
END PAD, (2 PIECES)
BOXED PROFILE
BOTTOM PAD

FIGURE 2

Old Style

The following instructions refer to Figure 2 unless otherwise stated.

1. Set the Packing Box on the floor with all flaps facing outside the box.

2. Bend the two End Pads and slide them into the box with the foam against the sides of the box.

3. Slide the Bottom Pad, with the foam side toward the bottom of the box, into position between the end pads.

4. Place the End Pads snugly onto the ends of the ProFile (see Figure 3).

5. Place the boxed ProFile on top of the Bottom Pad.

6. Lay the Top Pad, with the foam padding facing away from the ProFile, on top of the ProFile.

7. Place the Accessory Box, which contains the used LED Assembly, on top of the ProFile.

8. Close the end (short) flaps; then the side flaps.

9. Secure the flaps using shipping tape.

10. Secure shipping documentation to the top of the box.

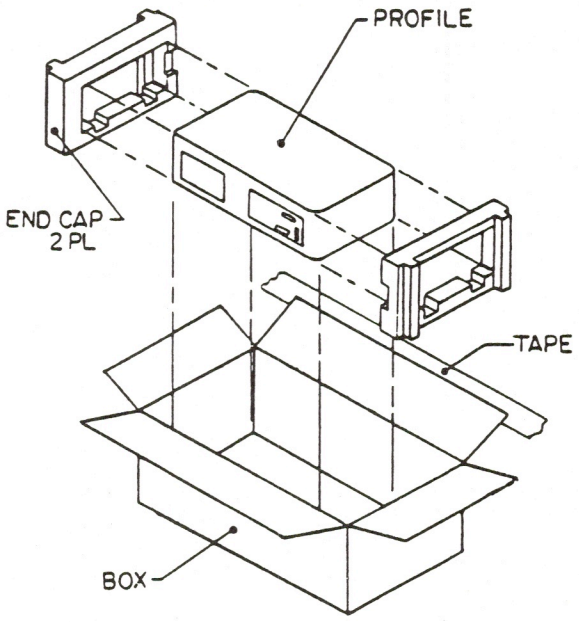


FIGURE 3

DuoDisk

Apple Technical Procedures

DuoDisk

Technical Procedures

❑ TABLE OF CONTENTS

Section 1 – Basics	1.2	Product Description
	1.2	Model Comparison
	1.2	Connecting the Drives
Section 2 – Take-Apart	2.2	Introduction – Interchangeable Parts
	2.3	Cover and Shield
	2.4	Analog Board
	2.6	Mechanical Assembly
	2.8	Sub-Bezel and Door
Section 3 – Adjustments	3.2	DSPEED
Section 4 – Troubleshooting	4.2	Introduction
	4.2	Using the Troubleshooting Flowchart
	4.3	Troubleshooting Flowchart
	4.4	Using the Analog Card Chip Swapping Chart
	4.5	Analog Card Swapping Chart
Section 5 – Preventive Maintenance	5.2	Introduction
	5.2	Read/Write Head
	5.3	Head Load Button
	5.4	Motor Drive Belt
Section 6 – Illustrated Parts List	6.3	External Parts
	6.5	Internal Parts
	6.7	Analog Card
Section 7 – Additional Procedures	7.2	Special Repair Procedure for Loose Analog Boards

©Apple Computer, Inc., 1985–87. No portion of this document may be reproduced in any form without the written permission of Apple Computer, Inc.

UniDisk and Apple IIGS are trademarks of Apple Computer, Inc.

DuoDisk, Apple, and the Apple logo are registered trademarks of Apple Computer, Inc.

Apple Technical Procedures

DuoDisk

Section 1 – Basics

❑ CONTENTS

1.2 Product Description
1.2 Model Comparison
1.2 Connecting the Drives

❑ PRODUCT DESCRIPTION

The Apple® DuoDisk® is effectively two disk drives in one case. Both drives are attached to a single analog card, with the drive on the left side defined as Drive 1.

There are four main modules that can be replaced: the interface card, the interface cable, the analog card, and the mechanical assembly. Chip swapping on the analog card is recommended before replacing the card.

Model Comparison

DuoDisk uses removable single-sided floppy disks to store and retrieve up to 143K of data per disk. The DuoDisk is compatible with any computer in the Apple II family, with the exception of the Apple IIc.

The contains the same drive mechanism as the Apple 5.25 Drive and UniDisk, but with a different sub-bezel.

Connecting the DuoDisk

The DuoDisk may be connected to a disk drive port (on an Apple IIGS™) or to a 5.25 Drive controller card installed in a peripheral slot (in an Apple II, II Plus, IIe, or IIGS). (The DuoDisk controller card is identical to the UniDisk™ or 5.25 Drive controller card.)

1. The controller card supports a maximum of one DuoDisk or two 5.25 drives. To add more drives, you must install a second 5.25 drive controller card. (You cannot plug a 3.5 drive into a 5.25 controller card, nor a DuoDisk into a 3.5 controller card.)

2. The disk drive port on the Apple IIGS will support a combination of up to four daisy chained 5.25 and 3.5 drives. A DuoDisk counts as *two* drives.

For installation instructions and daisy chain configurations, refer to the *DuoDisk Owner's Guide.*

Apple Technical Procedures

DuoDisk

Section 2 – Take-Apart

❑ CONTENTS

2.2 Introduction – Interchangeable Parts
2.3 Cover and Shield
2.4 Analog Board
2.6 Mechanical Assembly
2.8 Sub-Bezel and Door

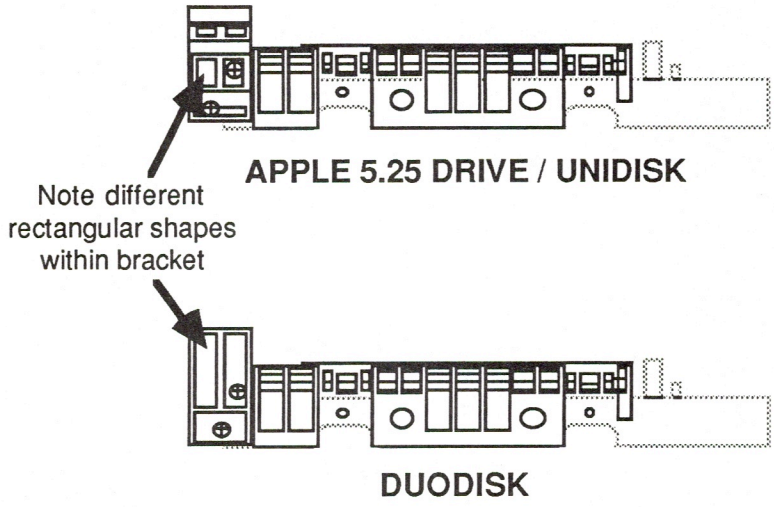
Note: If a step is underlined, detailed instructions for that step can be found elsewhere in this section.

❑ INTRODUCTION – INTERCHANGEABLE PARTS

The mechanical assemblies for the DuoDisk, UniDisk, and Apple 5.25 Drive are all the same and are therefore interchangeable—except for their sub-bezels and doors. **If you replace a DuoDisk mechanical assembly with an Apple 5.25 Drive or a UniDisk mechanical assembly, you must exchange the sub-bezels.** The figure below shows the different sub-bezels.

Be sure to replace the sub-bezel and door so that the colors are appropriate. The DuoDisk and UniDisk have beige doors and sub-bezels. The Apple 5.25 Drive has a platinum door and sub-bezel.

The procedures for replacement are given in "Sub-Bezel and Door" later in this Take-Apart section.



❑ COVER AND SHIELD

Materials Required

Medium Phillips screwdriver

Remove

To remove the top cover and shields:

1. Remove the two screws at the back of the unit, and remove the top cover.

2. Still facing the back of the unit, locate the right shield and remove the screw on the top. (This screw also secures one end of the ground strap.) Remove the right shield.

3. Now locate the left shield and remove the two screws that secure it to the chassis of the left drive.

4. Remove the screw that braces the left shield to the right drive, and remove the left shield.

Replace

To replace the shields and cover:

1. Position the DuoDisk with the back facing you.

2. Replace the metal shield on the left drive, fitting the front prongs into place. Make sure that the stepper motor cable on drive 2 fits through the semicircular cutout at the back of the shield.

3. Replace the two screws on the left drive shield and the one screw that fastens the left drive to the right drive.

4. Replace the shield on the right drive, and secure the shield and the ground strap with the top screw.

5. Slide the top cover into place, and replace the two screws at the back of the case.

❑ ANALOG BOARD

Remove

To remove the analog board:

1. Remove the top cover and right-drive shield.
2. Disconnect the read/write head cables (Figure 1, J1 and J2).

 Note: Always pull on the connector, not the wires.

3. Disconnect the stepper motor cables (Figure 1, J3 and J4). *Be sure to pull on the connector and not on the wire.*
4. Disconnect the LED cables (Figure 1, J6 and J7).
5. Remove the two screws, and slide the analog board out between the guides.

Replace

1. Lift the six connectors away from the mechanical assembly on the right drive, and position the analog board with the front through the guides.
2. Route the read/write head cables (Figure 1, J1) and stepper motor cables (Figure 1, J3) through their respective cutouts.
3. Secure the analog board with the two screws.
4. Reconnect the stepper motor cable (Figure 1, J3) for the right drive. If there is no key to indicate correct orientation, the side with "A2" should be face up. (There will be no wires for pins 1 and 2.)
5. Route the left-drive stepper motor cable through the cutout at the back of the shield, and connect it (Figure 1, J4).
6. Route the read/write head cable for the left drive through the cutouts, and connect it (Figure 1, J2). Make sure the shrink tubing fits in the cutouts.

 Note: The connector will fit on either way, so make sure that each pin of the fixture is aligned with a metal tab within the connector.

7. Reconnect the read/write head cable for drive 1 (Figure 1, J1).

8. Reconnect the LED cables for the left drive (Figure 1, J6) and for the right drive (Figure 1, J7).

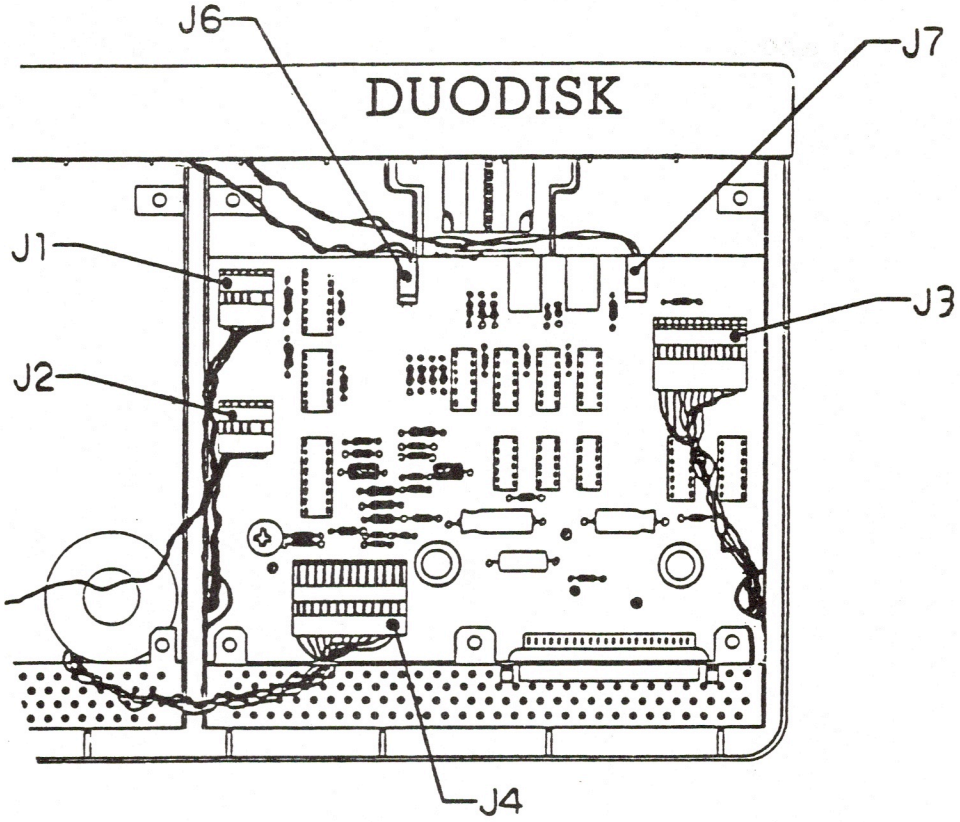


FIGURE 1

❑ MECHANICAL ASSEMBLY

If you are replacing a DuoDisk mechanical assembly with a UniDisk or 5.25 Drive mechanical assembly, see the "Introduction" at the beginning of this section.

Remove

To remove the mechanical assembly:

1. Remove the top cover, the shield, the cable, and the analog board..

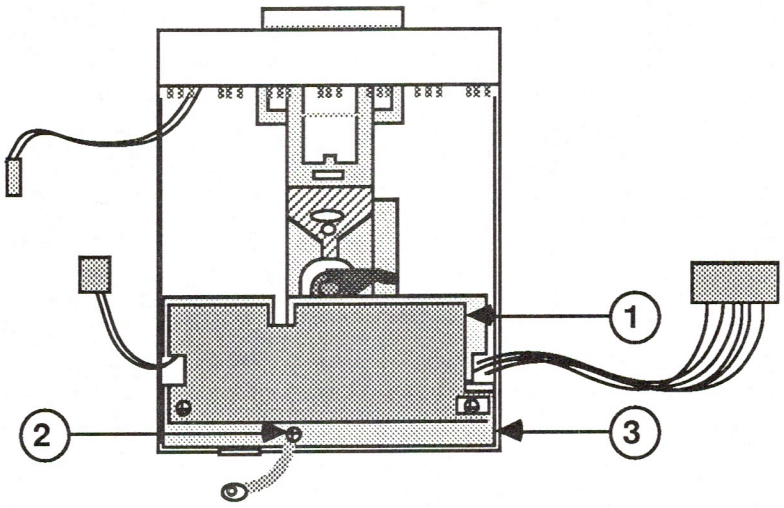


FIGURE 2

2. Remove the black insulation paper (Figure 2, #1).

3. Remove the Phillips screw (Figure 2, #2) that secures the ground strap to the chassis. Set the ground strap aside.

4. Lift off the metal shield (Figure 2, #3) and set it aside.

5. Lift up on the back of the metal chassis, and slide it completely out of the case bottom.

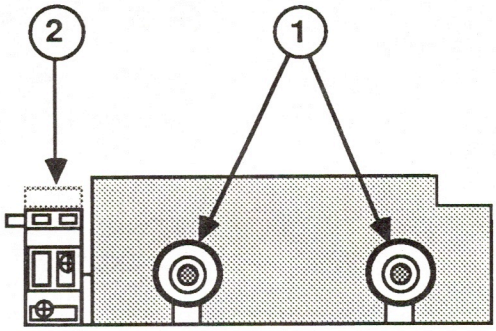


FIGURE 3

6. Orient the drive sideways, as shown in Figure 3, and remove the two Phillips screws (Figure 3, #1). Then turn the drive so that you face the other side, and remove those two screws.

7. Lift up on the sub-bezel (Figure 3, #2) and carefully slide the mechanical assembly out of its metal housing.

Replace

To replace the mechanical assembly:

1. Place the mechanical assembly back inside its metal housing.

2. Replace the Phillips screws (Figure 3, #1) on both sides of the drive to secure the mechanical assembly inside the metal housing.

3. Replace the metal shield (Figure 2, #3), routing the cables through the cutouts at the sides of the shield (see Figure 2).

4. Place the black insulation paper (Figure 2, #1) on the metal shield.

5. Replace the Phillips screw (Figure 2, #2) to secure one end of the ground strap to the chassis.

6. Close the door of the mechanical assembly.

7. Hold the LED cable out of the way while you carefully slide the mechanical assembly into the case bottom.

8. Replace the analog board, the cable, the shield, and the top cover.

❑ SUB-BEZEL AND DOOR

Remove

To remove the sub-bezel and door:

1. Remove the case top and shield, the cable, the analog board, and the mechanical assembly.

2. Remove the two Phillips screws at each side of the sub-bezel.

3. Slide the door and spring off the mechanical assembly.

Replace

To replace the sub-bezel and door:

1. Replace the door, making sure the side edges fit into the grooves on the metal carriage (Figure 4, #1) and the door springs fit over the supporting tabs (Figure 4, #2).

2. Replace the sub-bezel and its two Phillips screws.

 Note: A defective mechanical assembly must be returned to Apple with a sub-bezel attached.

3. Replace the case top and shield, the analog board, and the mechanical assembly.

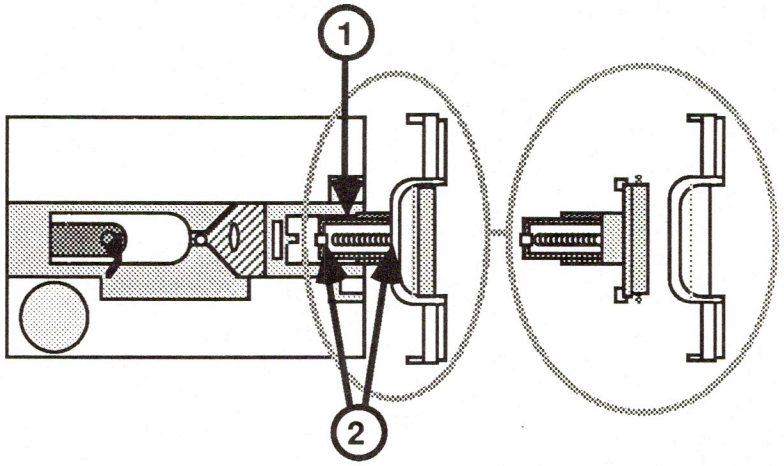


FIGURE 4

Apple Technical Procedures

DuoDisk

Section 3 – Adjustments

❑ CONTENTS

3.2 DSPEED

❑ DSPEED

This adjustment procedure was written to be used with the *Apple 5.25-Inch Disk Drive Diagnostic*—if the test indicates that you need to adjust the drive speed. All information on setting up and running the diagnostic is in the *Disk Drives Technical Procedures,* Section 1, 5.25-Inch Disk Drive Diagnostic.

Materials Required

Apple 5.25-Inch Disk Drive Diagnostic diskette
Disk Drives Technical Procedures
A small (jeweler's) flatblade screwdriver
Apple II, II Plus, IIe, or IIGS with video display
DuoDisk to be adjusted
DuoDisk interface card

Making the Adjustment

To adjust the DSPEED (drive speed):

1. The "working" drive should be connected to the analog card as drive 1, the drive to be adjusted connected as drive 2.

2. You should have the diagnostic running; if you do not, see the *Disk Drives Technical Procedures,* Section 1, 5.25-Inch Disk Drive Diagnostic.

3. Locate the DSPEED adjustment hole under the drive being tested. It is a small hole near the front of the drive. The adjustment screw is located inside the hole.

 Note: When you make the DSPEED adjustment, keep the DuoDisk flat.

4. The adjustment is extremely sensitive, so turn the adjustment screw very slowly. The indicator on the screen will move back and forth, showing changes of the speed.

5. Adjust the speed so that it is within the "good" range, as close to 0 as possible. Let the test run for 30 seconds.

6. Press <Escape> to return to the main menu; then repeat the test.

 Does the DSPEED now stay within the "good" range?

 - Yes—Press <Escape> to return to the main menu.

 - No—If the DSPEED cannot be properly adjusted, return the faulty drive mechanism to Apple.

7. Remove the *Apple 5.25-Inch Disk Drive Diagnostic* diskette from the drive.

Apple Technical Procedures

DuoDisk

Section 4 – Troubleshooting

❑ CONTENTS

4.2 Introduction
4.2 Using the Troubleshooting Flowchart
4.3 Troubleshooting Flowchart
4.4 Using the Analog Card Chip Swapping Chart
4.5 Analog Card Chip Swapping Chart

❑ INTRODUCTION

The Apple DuoDisk disk drive is effectively two disk drives in one case. Both drives are attached to a single analog card, with the drive on the left side defined as drive 1.

There are four main modules which can be replaced: the interface card, the interface cable, the analog card, and the mechanical assembly. Chip swapping on the analog card is recommended before replacing the card.

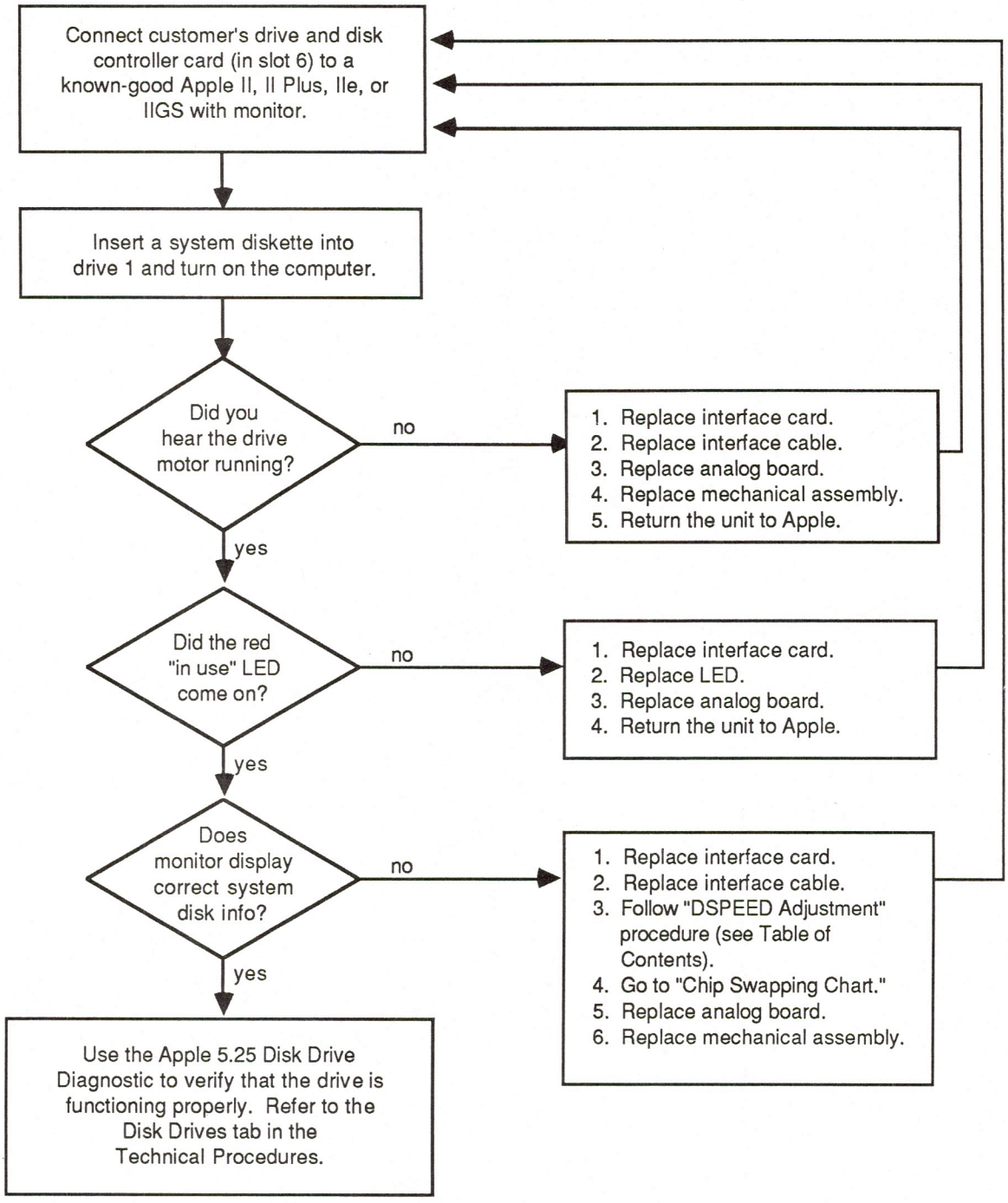
❑ USING THE TROUBLESHOOTING FLOWCHART

Whenever a customer brings in a malfunctioning DuoDisk, use the flowchart on the following page as a troubleshooting guide. Begin with the box at the upper left corner of the page. When you get to one of the answer boxes, swap the modules, one at a time, in the order in which they are listed. Each time you swap a module, go back to the beginning of the flowchart and try to boot a system diskette (preferably a *ProDOS System Master*).

Once you are able to boot the system diskette, run the *Apple 5.25-Inch Disk Drive Diagnostic*, performing any adjustments necessary. Reinstall the customer's modules, one at a time, running the drive diagnostic after each exchange to isolate the bad modules.

It is possible for the DuoDisk to destroy data on the diskette. This can occur when attempting the <Open-Apple><Control><Reset> technique for rebooting, or when using software with certain copy-protection schemes. If a unit exhibits this problem but passes the *Apple 5.25-Inch Disk Drive Diagnostic*, check the analog board. Analog boards with part numbers 676-[]101 and 676-[]102 may have this problem. The fix is to carefully identify and cut the two capacitors off the board. The capacitors, labeled C29 and C30, are in zones B1 and A1 (see the "Analog Card Chip Swapping Chart" and Figure 1, #4 and #5). Use small wire clippers or simply jiggle the capacitors to snap the connections.

TROUBLESHOOTING FLOWCHART



❑ USING THE ANALOG CARD CHIP SWAPPING CHART

The chip swapping chart can be used for drive 1 or drive 2. Remove the DuoDisk cover and shield to access the analog card (see Section 3, Take-Apart).

There are three different versions of the analog card. Identify which card you have by the engineering number on the card (see Figure 1, #1 and Figure 2, #1). Figure 1 shows the layout of cards with engineering numbers 676-[]101 and 676-[]102. Figure 2 shows the layout of cards with engineering number 676-[]107.

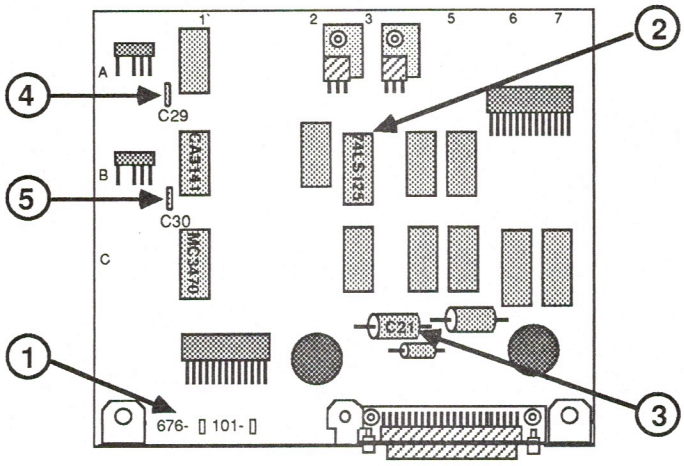


FIGURE 1

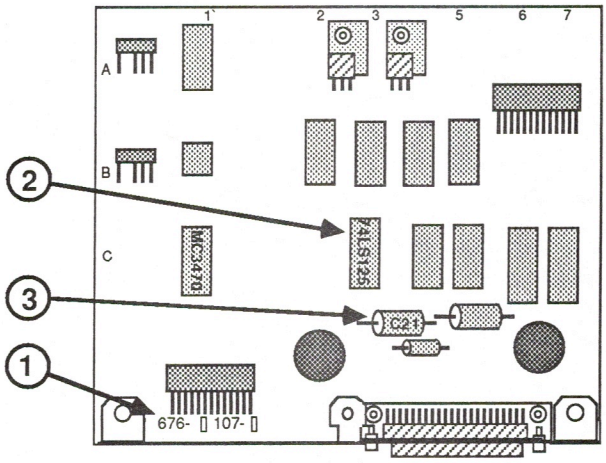


FIGURE 2

Before replacing any chips, carefully inspect the card for melted or broken components, particularly the 74LS125 (see Figure 1, #2, or Figure 2, #2) and C21 (see Figure 1, #3, or Figure 2, #3). If you notice fuzz on the card, return the card to Apple. This usually means that the power was on to the computer while the card was being installed and capacitor C21 has exploded.

Here's What To Do

Identify the symptom and replace the related chips, one at a time, in the order in which they are listed. Each time you replace a chip, turn the computer on to see if the problem is gone. If the problem still exists after you have replaced all the chips related to the problem, return to the answer box where you left off on the troubleshooting flowchart and continue with the next step in the box.

❑ ANALOG CARD CHIP SWAPPING CHART

Symptom	Location	Defective Chip Type
• *Motor and LED on but disk won't boot*	B1 B3 C1	CA3141* 74LS125 MC3470
• *Drive reads but does not write*	B1 B3	CA3141* 74LS125
• *Data on disk is damaged when using <Open-Apple><Control><Reset> or when using certain copy-protected software,* ***and*** *unit passes Apple 5.25-Inch Disk Drive Diagnostic,* ***and*** *analog board engineering number is 676-[]101 or 676-[]102.*	A1 B1	Capacitor C29* Capacitor C30* (remove both, do not replace)

*Analog board engineering numbers 676-[]101 or 676-[]102 only.

Apple Technical Procedures

DuoDisk

Section 5 – Preventive Maintenance

❑ CONTENTS

5.2 Introduction
5.2 Read/Write Head
5.3 Head Load Button
5.4 Motor Drive Belt

Note: If a step is underlined, detailed instructions for that step can be found in Section 2, Take-Apart.

❑ INTRODUCTION

The read/write head should be cleaned any time the computer or disk drive is being serviced. The head load button should be replaced whenever it is worn or dirty. The motor drive belt should be inspected any time the disk drive is being serviced.

❑ READ/WRITE HEAD

Materials Required

#2 Phillips screwdriver
Cotton swabs
Isopropyl Alcohol (80% alcohol/20% water)

Procedure

To service the read/write head:

1. Remove the top cover, drive shield, and analog board
2. Clean the guide rails with the isopropyl alcohol. **Do not** use grease.
3. Inspect the head for worn or dull spots in the ceramic. If you find any, replace the mechanical assembly.
4. Clean the head with the isopropyl alcohol.
5. Move the read/write head assembly back and forth along the full length of its travel. Check for any blockage or friction. If there is any, replace the mechanical assembly.
6. Replace the analog board, drive shield, and top cover.

❑ HEAD LOAD BUTTON

Materials Required

#2 Phillips screwdriver
Needlenose pliers
Head load button

Procedure

To service the head load button:

1. Remove the top cover, drive shield, and analog board.

2. Lift up the head load arm. If the head load button is worn or dirty, squeeze the top part of the load button with small needlenose pliers, and let the button drop down.

3. Insert the new load button into the head load arm. Press the button until it snaps into place.

5. Replace the analog board, drive shield, and top cover.

❑ MOTOR DRIVE BELT

Materials Required

#2 Phillips screwdriver
Motor drive belt

Procedure

To service the motor drive belt:

1. Remove the case, and the top and bottom shield.
2. Turn the drive upside down, and locate the motor dirve belt. Check the belt for cracks, slippage, and elasticity. If the belt is dry or cracked, or if it slips, continue with step 3.
3. Slip the belt off the pulley.
4. Place the new belt around the motor spindle and then slip it around the pulley.
5. Replace the top and bottom shield, and the case.

Apple Technical Procedures

DuoDisk

Section 6 – Illustrated Parts List

❑ CONTENTS

6.3 External Parts (Figure 1)
6.5 Internal Parts (Figure 2)
6.7 Analog Card (Figure 3)

The figures and lists in this section include all piece parts that can be purchased separately from Apple for the DuoDisk, along with their part numbers. These are the only parts available from Apple. Refer to your *Apple Service Programs Manual* for prices.

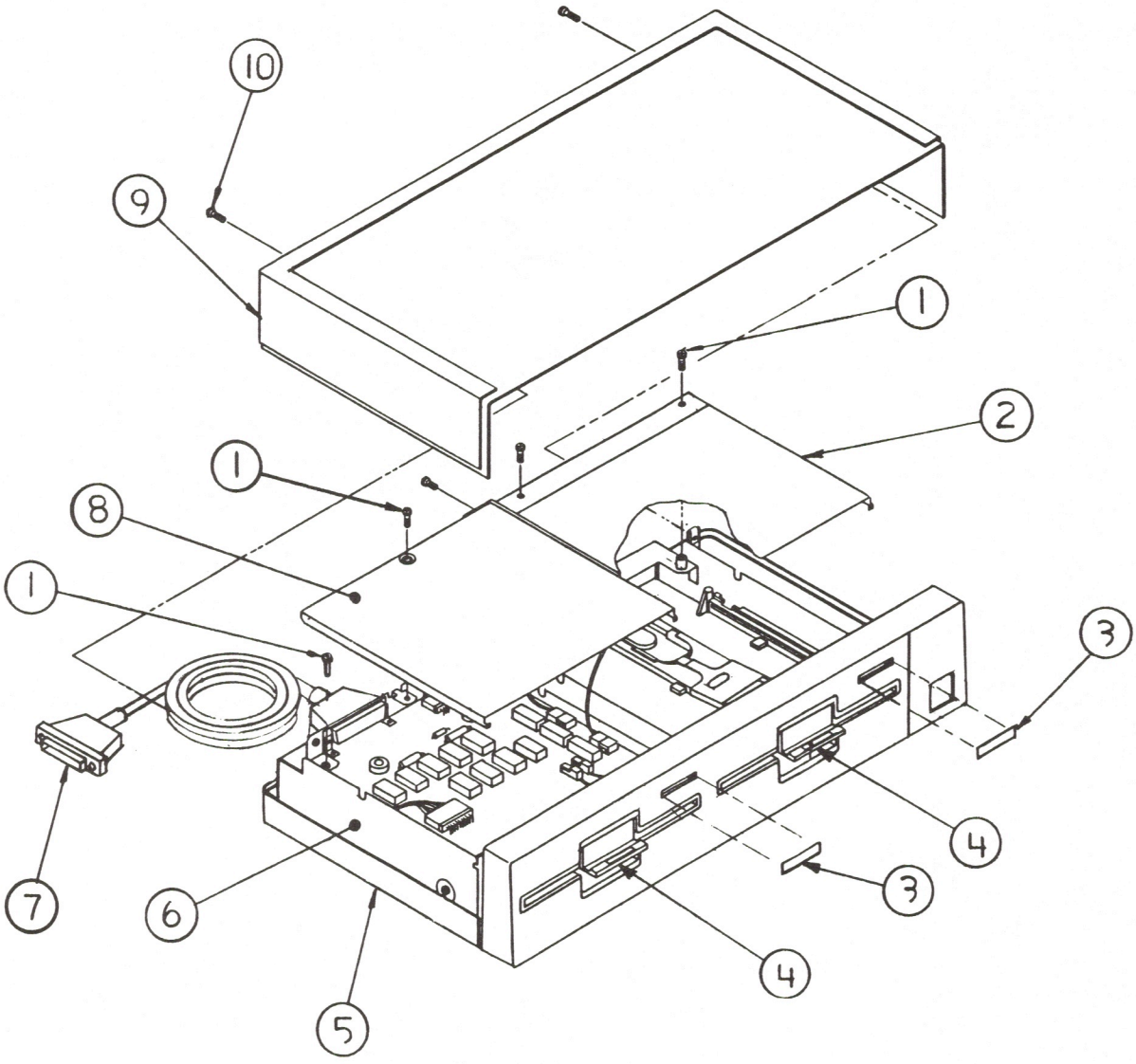


FIGURE 1

❑ DUODISK – EXTERNAL PARTS (Figure 1)

Item	Part No.	Description
1	400-1604	Screw, 6-32 x 1/4
2	805-5002	Drive 2 Top Shield
3	825-0548	Uni/DuoDisk Drive # Label
4	815-0637	Door, Beige
5	676-5101	Subassembly Bottom Cover
6	805-5000	DuoDisk Shield
7	590-0114	DuoDisk Cable
8	805-5001	Drive 1 Top Shield
9	676-5103	Top Cover Assembly
10	415-1410	Screw, M3.5 x 6 x 10mm, PN

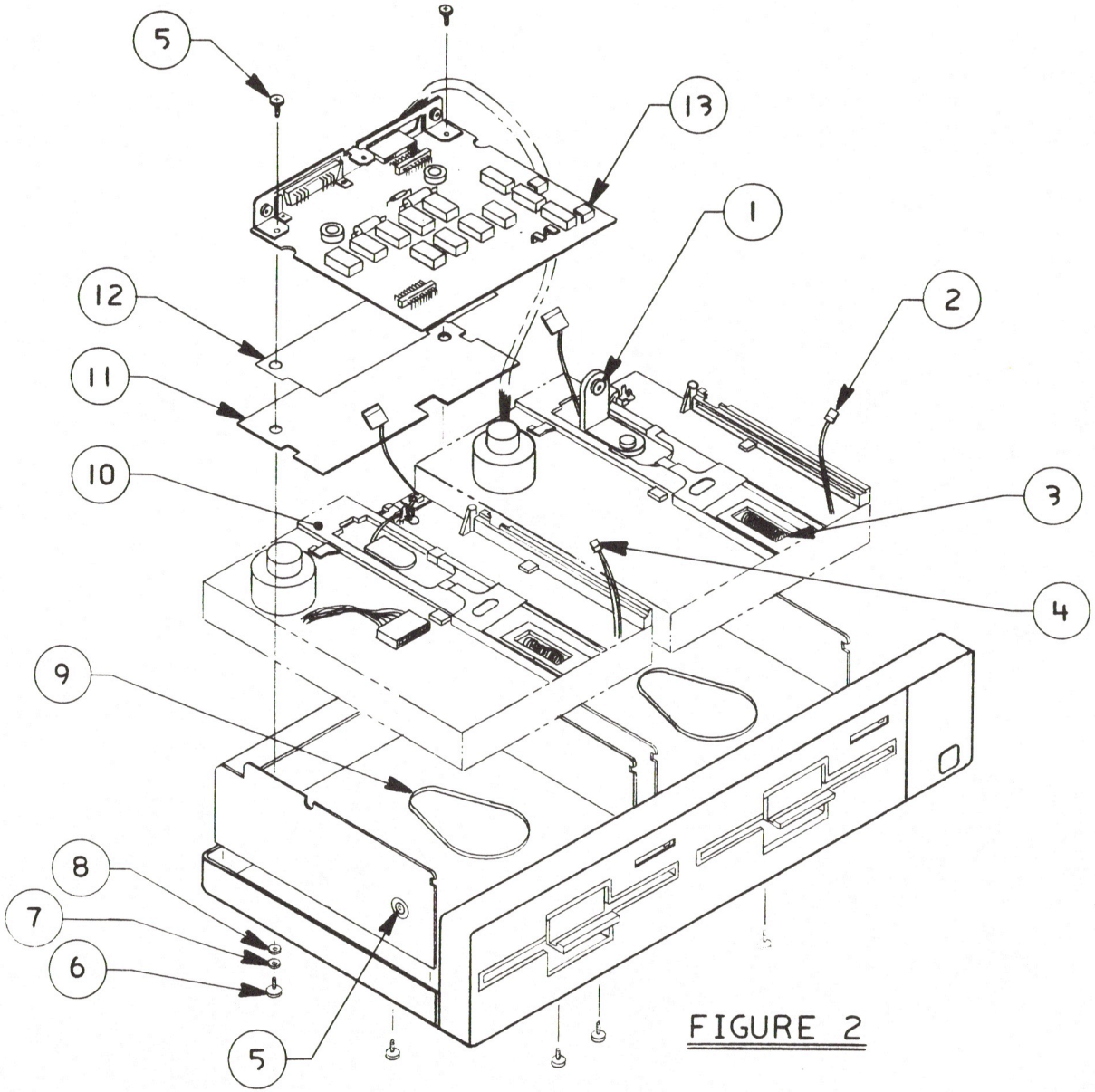


FIGURE 2

❑ DUODISK – INTERNAL PARTS (Figure 2)

Item	Part No.	Description
1	U815-0064	Load Button
2	590-0223	LED Cable Assembly, Drive 2
3	870-0023	Spring, Disk Door
4	590-0140	LED Cable Assembly, Drive 1
5	400-1604	Screw, 6-32 x 1/4
6	407-1605	Screw, 6-32 x 5/16 Pan Head
7	860-0242	Washer, M3.5 x 4.0 I.D. x 7.0 O.D.
8	860-0053	Washer, Split Lock Metric, M3.5
9	U880-0002	Disk Drive Belt
10	661-72128	Uni/DuoDisk Disk Mechanical Assembly
11	805-5028	Shield Plate
12	805-5029	Insulating Seat
13	661-92130	DuoDisk Analog Card

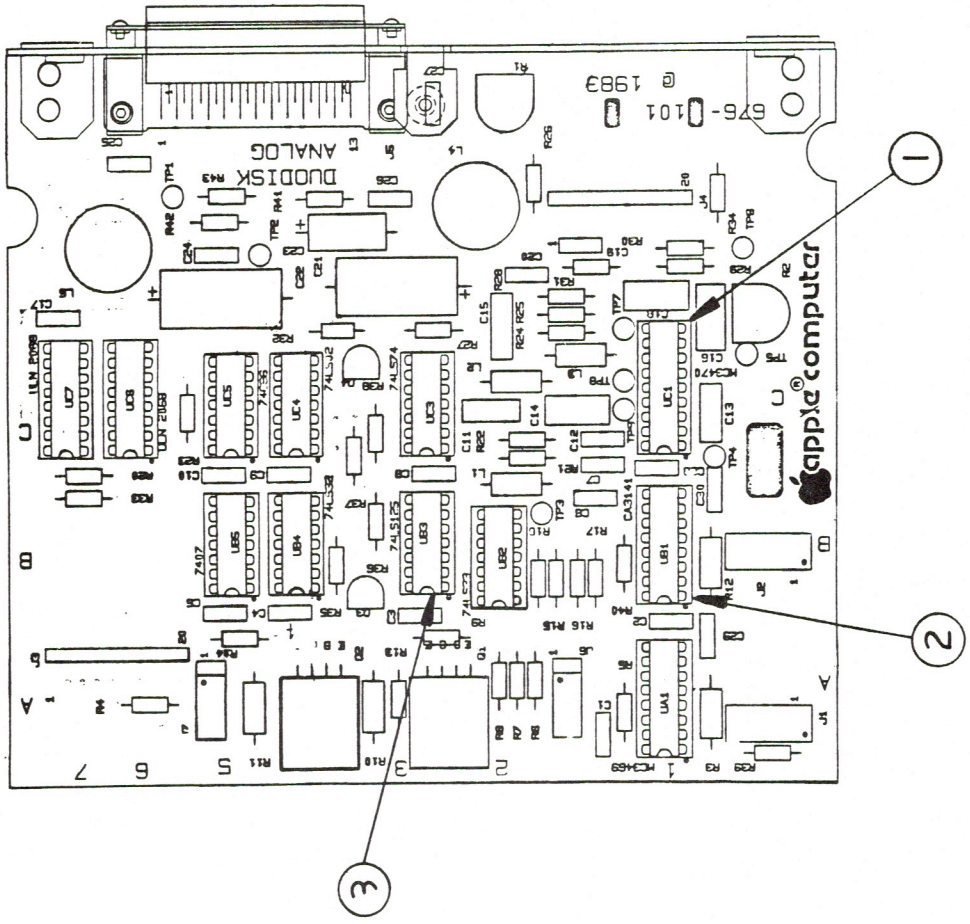


FIGURE 3

❑ DUODISK – ANALOG CARD (Figure 3)

Item	Part No.	Description
1	355-3470	IC, MC3470 Floppy Disk Read Ampl.
2	352-3141	IC, High Voltage Diode 30V, 100 mA
3	306-0125	IC, 74LS125

Apple Technical Procedures

DuoDisk

Section 7 – Additional Procedures

❑ CONTENTS

7.2 Special Repair Procedure for Loose Analog Boards

❑ SPECIAL REPAIR PROCEDURE

Background

Some DuoDisks with serial numbers before 325000 have loose analog boards that may slip out of their guide tracks (the forward supports on the sides of the shield). This brings the analog board into contact with the disk mechanical assembly and may short-circuit the board.

Procedure

If you are repairing one of these drives:

1. Check the serial number of the DuoDisk: If it is below 325000, continue with this procedure.

2. Using needlenose pliers, bend the top of the shield inward about 1 mm, so that the guides hold the analog board firmly in place.

IMPORTANT: *Do not bend the shield too far, as any stress on the mechanical assembly may cause problems with head radial alignment.*

3. Run the *Apple 5.25-Inch Disk Drive Diagnostic*, to check for possible head radial alignment problems caused by stress on the mechanical assembly. If there is such a problem, bend the shield back until it no longer occurs. If the drive continues to fail the diagnostic, send it back to Apple for repair.

4. Look through the disk drive door to make sure that the analog board is seated correctly. If the analog board still falls off its supports, repeat steps 2–4.

Disk IIc

Apple Technical Procedures

Disk IIc

Table of Contents

Section 1 – Take-Apart	1.3	Case
	1.5	Analog Card
	1.7	Mechanical Assembly
	1.8	Bezel, Door, and Spring Assembly
	1.10	LED Cable
Section 2 – Adjustments	2.2	DSPEED
Section 3 – Preventive Maintenance	3.2	Introduction
	3.2	Read/Write Head
	3.3	Head Load Button
	3.4	Motor Drive Belt
Section 4 – Illustrated Parts List	4.3	Finished Goods Assembly

©Apple Computer, Inc., 1986, 1987. No portion of this document may be reproduced in any form without the written permission of Apple Computer, Inc.

Disk IIc is a trademark of Apple Computer, Inc. Apple and the Apple logo are registered trademarks of Apple Computer, Inc.

Apple Technical Procedures

Disk IIc

Section 1 – Take-Apart

❑ CONTENTS

1.3 Case
1.5 Analog Card
1.7 Mechanical Assembly
1.8 Bezel, Door, and Spring Assembly
1.10 LED Cable

Note: If a step is underlined, detailed instructions for that step can be found elsewhere in this section.

❑ CASE

Materials Required

#2 Phillips screwdriver

Remove

1. Turn the disk drive upside down.
2. Remove the eight Phillips screws (Figure 1, #1).

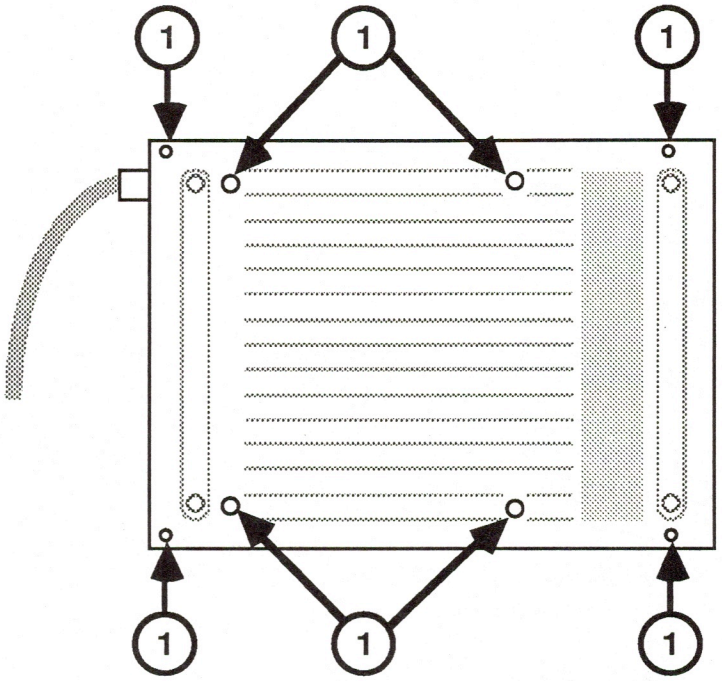


FIGURE 1

3. Hold the case together and turn it over.
4. Remove the top cover.
5. Slip the cable out of the slot in the rear of the case bottom and remove the disk drive from the case.

Replace

1. Place the disk drive into the bottom of the case (shield side up). Carefully route the cable behind the drive and out of the case. The cable grommet should seat into the cut-out in the case.

2. Fit the top cover onto the base.

3. Hold the case together and turn it over.

4. Replace the eight Phillips screws.

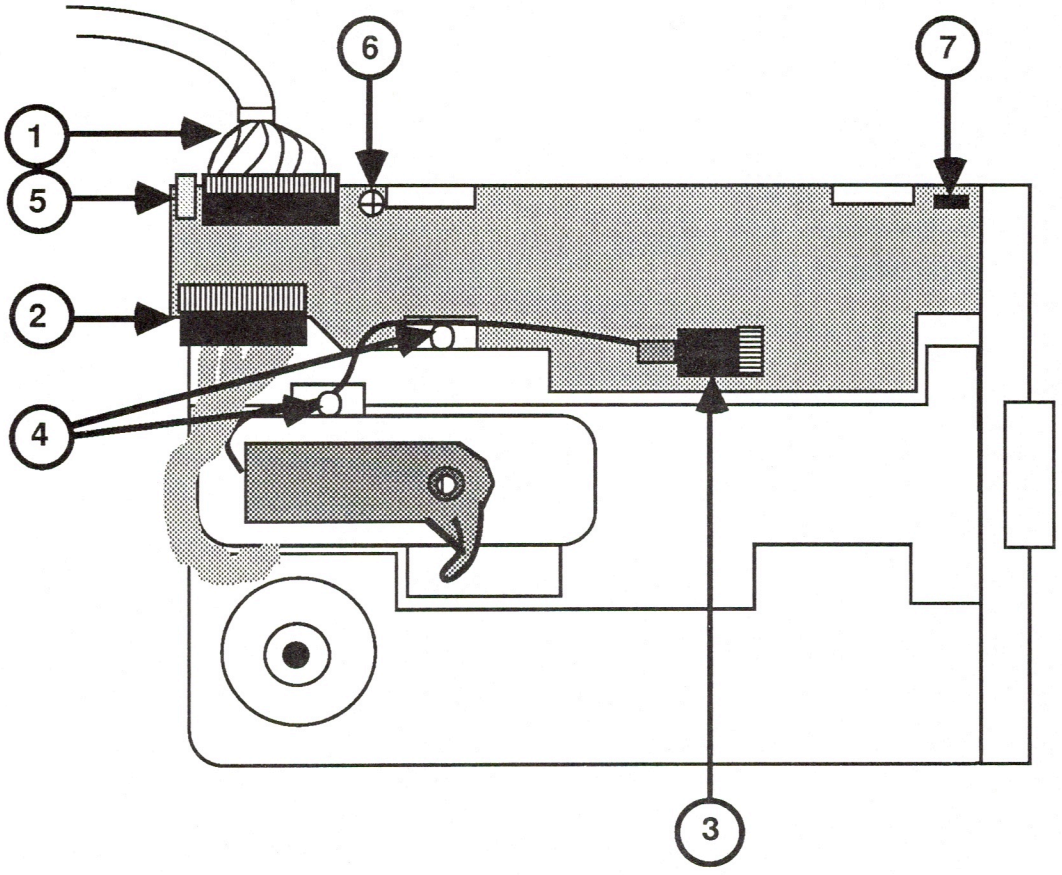


FIGURE 2

❑ ANALOG CARD

Materials Required

#2 Phillips screwdriver

Remove

1. Remove the case.
2. Remove the four Phillips screws, two from either side of the disk drive shield.
3. Remove the cable from the disk drive (Figure 2, #1).
4. Pull up on the shield to remove it from the disk drive.
5. On the analog card, disconnect the motor cable from connector J2 (Figure 2, #2).
6. On the analog card, disconnect the read/write head cable from connector J3 (Figure 2, #3) and carefully remove the wire from the clips (Figure 2, #4).
7. On the analog card, disconnect the LED cable from connector J4 (Figure 2, #5).
8. Remove the Phillips screw that mounts the analog card to the disk drive chassis (Figure 2, #6).
9. Tilt the rear edge of the analog card slightly up and slide the card away from the disk drive.

Replace

1. Slide the front edge of the card under the two plastic posts located on the inside of the disk drive bezel. Lay the card on the chassis so that the alignment tab (Figure 2, #7) protrudes through the hole.
2. Replace the Phillips mounting screw.
3. Look at the read/write head cable (Figure 2, #3) that attaches to connector J3 and note that only four wires are connected to the five pin connector. Connect the read/write head cable, making sure that each wire makes contact with a pin on the header.

4. Position the wire and, if necessary, carefully bend the clips.

5. Connect the motor cable to connector J2. The cable should be oriented so that the end of the connector with the single wire is toward the rear of the disk drive.

6. Connect the small end of the LED cable to connector J4 so that the wires are towards the bottom of the disk drive.

7. Replace the shield and corresponding Phillips screws. Make sure the ground clip is installed at the right-rear position.

8. Replace the disk drive cable. Orient the cable so that the two unused positions are at the front of the connector.

9. Replace the case.

❑ MECHANICAL ASSEMBLY

Materials Required

#2 Phillips screwdriver

Remove

1. Remove the analog card.

2. Replace the shield if returning the mechanical assembly to Apple for exchange.

 Note: The disk drive shield must be installed on the mechanical assembly when the disk drive is sent to Apple for exchange. Also, be sure to remove the LED cable.

Replace

1. Remove the shield if present.

2. Replace the analog card

❑ BEZEL, DOOR, AND SPRING ASSEMBLY

Materials Required

#2 Phillips screwdriver

Remove

1. Remove the case.
2. Remove the four Phillips screws, two from either side of the disk drive shield.
3. Pull up on the shield to remove it from the disk drive.
4. Remove the four Phillips screws that attach the bezel to the disk drive (two screws on each side).
5. Open the disk drive door by pushing inward. As you pull the bezel from the disk drive, hold on to the spring. It is not firmly attached and may fall out.
6. To remove the door from the bezel, simultaneously push it forwards and rotate the rear edge up. Now pull it backwards out of the bezel.
7. Remove the spring from the door.

If Bezel replacement is necessary, additionally perform the steps in "LED Cable" at the end of this section.

Replace

1. Put the door in the bezel (Figure 3, detail A).

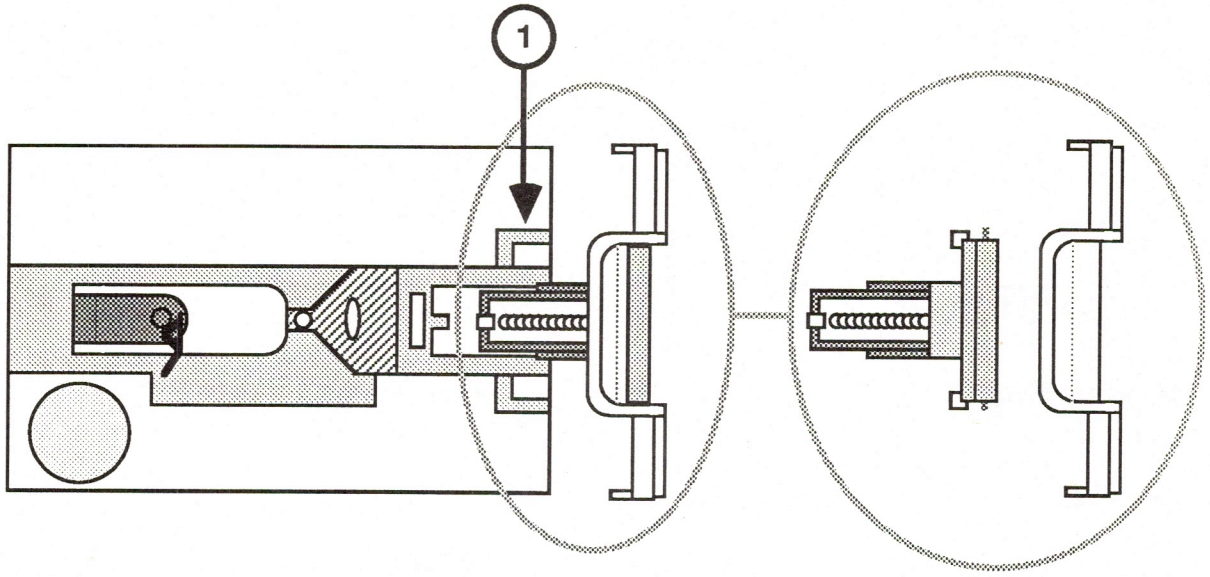


FIGURE 3

2. Hold the door and bezel together. Slide the projecting part of the door partway into the grooves of the hub frame (Figure 3, detail B).

3. As you fit the bezel onto the disk drive:

 a) Push down the hub frame so that its aluminum arms (Figure 3, #1) fit under the top edge of the bezel.

 b) If the analog card is present, make sure that it is held in place under the two tiny posts on the inside of the bezel.

4. Install the spring. It helps to guide the spring with one finger under the disk drive door.

5. Close the disk drive door and put the bezel into place.

6. Replace the Phillips screws that attach the bezel to the disk drive.

7. Replace the shield and corresponding Phillips screws. Make sure the ground clip is installed at the right-rear position.

8. Replace the disk drive cable. Orient the cable so that the two unused positions are at the front of the connector.

9. Replace the case.

❑ LED CABLE

Materials Required

Jeweler's flatblade screwdriver

Remove

1. Remove the bezel.

2. Press the face of the LED towards the rear of the bezel, while gently prying apart the LED holder with the screwdriver. Do this until the LED snaps free of the bezel.

Replace

1. Slip the LED back into its holder and snap it into place.

 Note: This is easier if the flat edge on the LED is aligned with one of the two openings in the holder and support the holder from the front with your fingers.

2. Route the cable as shown in Figures 4, #1 and 5, #1.

3. Replace the bezel.

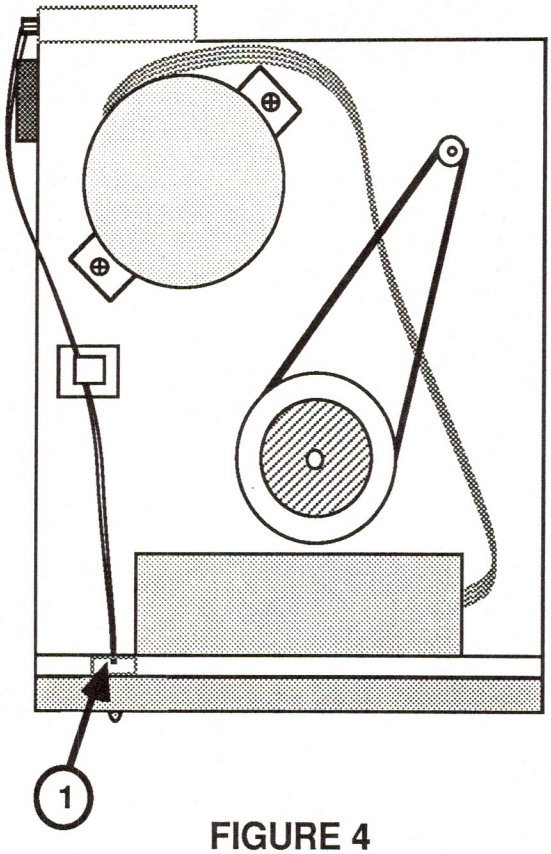


FIGURE 4

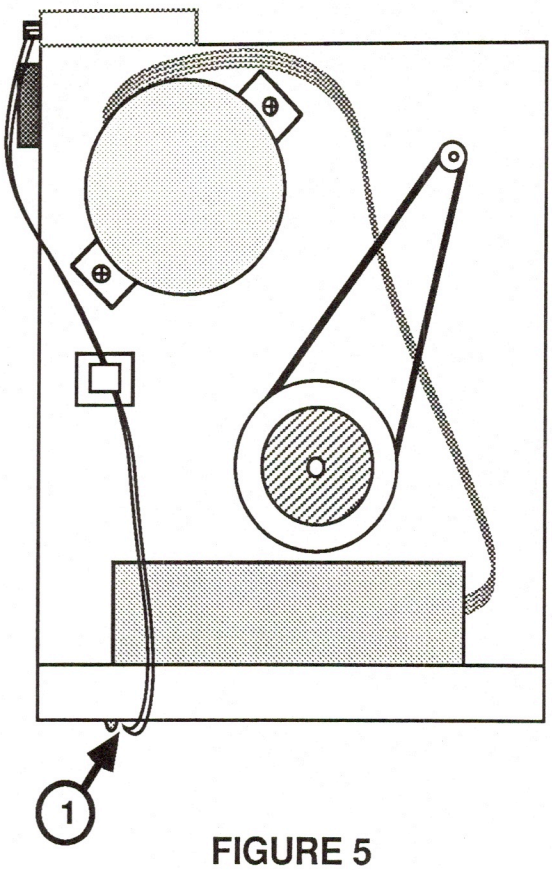


FIGURE 5

Apple Technical Procedures

Disk IIc

Section 2 – Adjustments

❑ CONTENTS

2.2 DSPEED

Note: If a step is underlined, detailed instructions for that step can be found in Section 1, Take-Apart.

❑ DSPEED

This adjustment procedure was written to be used with the *Apple 5.25-Inch Disk Drive Diagnostic*—if the test indicates that you need to adjust the drive speed. All information on setting up and running the diagnostic is in the *Disk Drives Technical Procedures*, Section 1, 5.25-Inch Disk Drive Diagnostic.

Materials Required

Apple 5.25-Inch Disk Drive Diagnostic diskette
Disk Drives Technical Procedures manual
A small (jeweler's) flatblade screwdriver
Apple IIc with video display
The Disk IIc to be adjusted

Making the Adjustment

To adjust the DSPEED (drive motor speed):

1. Remove the Disk IIc case.

2. Start the DSPEED diagnostic running (see the *Disk Drives Technical Procedures*, Section 1, 5.25-Inch Disk Drive Diagnostic). The diagnostic diskette should be placed in the external drive after it has been loaded from the internal drive.

3. Turn the drive upside down, and locate the DSPEED adjustment screw, VR1, on the printed circuit board.

 Note: When you make the DSPEED adjustment, keep the disk drive flat.

4. The adjustment is extremely sensitive, so turn the adjustment screw very slowly. The indicator on the screen will move back and forth, showing changes of the speed.

5. Adjust the speed so that the indicator is within the "good" range, as close to 0 as possible. Let the test run for 30 seconds.

6. Press <Escape> to return to the main menu; then repeat the test.

 Does the DSPEED now stay within the "good" range?

 - Yes—Press <Escape> to return to the main menu.

 - No—If the DSPEED cannot be properly adjusted, return the faulty mechanical assembly to Apple.

7. Remove the *Apple 5.25-Inch Disk Drive Diagnostic* diskette from the external drive.

8. Replace the case.

Apple Technical Procedures

Disk IIc

Section 3 – Preventive Maintenance

❑ CONTENTS

3.2 Introduction
3.2 Read/Write Head
3.3 Head Load Button
3.4 Motor Drive Belt

Note: If a step is underlined, detailed instructions for that step can be found in Section 1, Take-Apart.

❑ INTRODUCTION

The read/write head should be cleaned any time the computer or disk drive is being serviced. The head load button should be replaced whenever it is worn or dirty. The drive motor belt should be inspected any time the disk drive is being serviced.

❑ READ/WRITE HEAD

Materials Required

#2 Phillips screwdriver
Cotton swabs
Isopropyl Alcohol (80% alcohol/20% water)

Procedure

To service the read/write head:

1. Remove the case and drive shield.
2. Clean the guide rails with the isopropyl alcohol. **Do not** use grease.
3. Inspect the head for worn or dull spots in the ceramic. If you find any, replace the mechanical assembly.
4. Clean the head with the isopropyl alcohol.
5. Move the read/write head assembly back and forth along the full length of its travel. Check for any blockage or friction. If there is any, replace the mechanical assembly.
6. Replace the drive shield and case.

❑ HEAD LOAD BUTTON

Materials Required

#2 Phillips screwdriver
Needlenose pliers
Head load button

Procedure

To service the head load button:

1. Remove the case and drive shield.

2. Lift up the head load arm. If the head load button is worn or dirty, squeeze the top part of the load button with small needlenose pliers, and let the button drop down.

3. Insert the new load button through the hole in the shield plate and into the head load arm. Press the button until it snaps into place.

4. Replace the drive shield and case.

❑ MOTOR DRIVE BELT

Materials Required

#2 Phillips screwdriver
Motor drive belt

Procedure

To service the motor drive belt:

1. Remove the case.
2. Turn the drive upside down and locate the belt. Inspect the belt for cracks, slippage, and elasticity. If the belt is dry or cracked, or if it slips, continue with step 3.
3. Slip the belt off the pulley.
4. Place the new belt around the motor spindle and then slip it around the pulley.
5. Replace the case.

Apple Technical Procedures

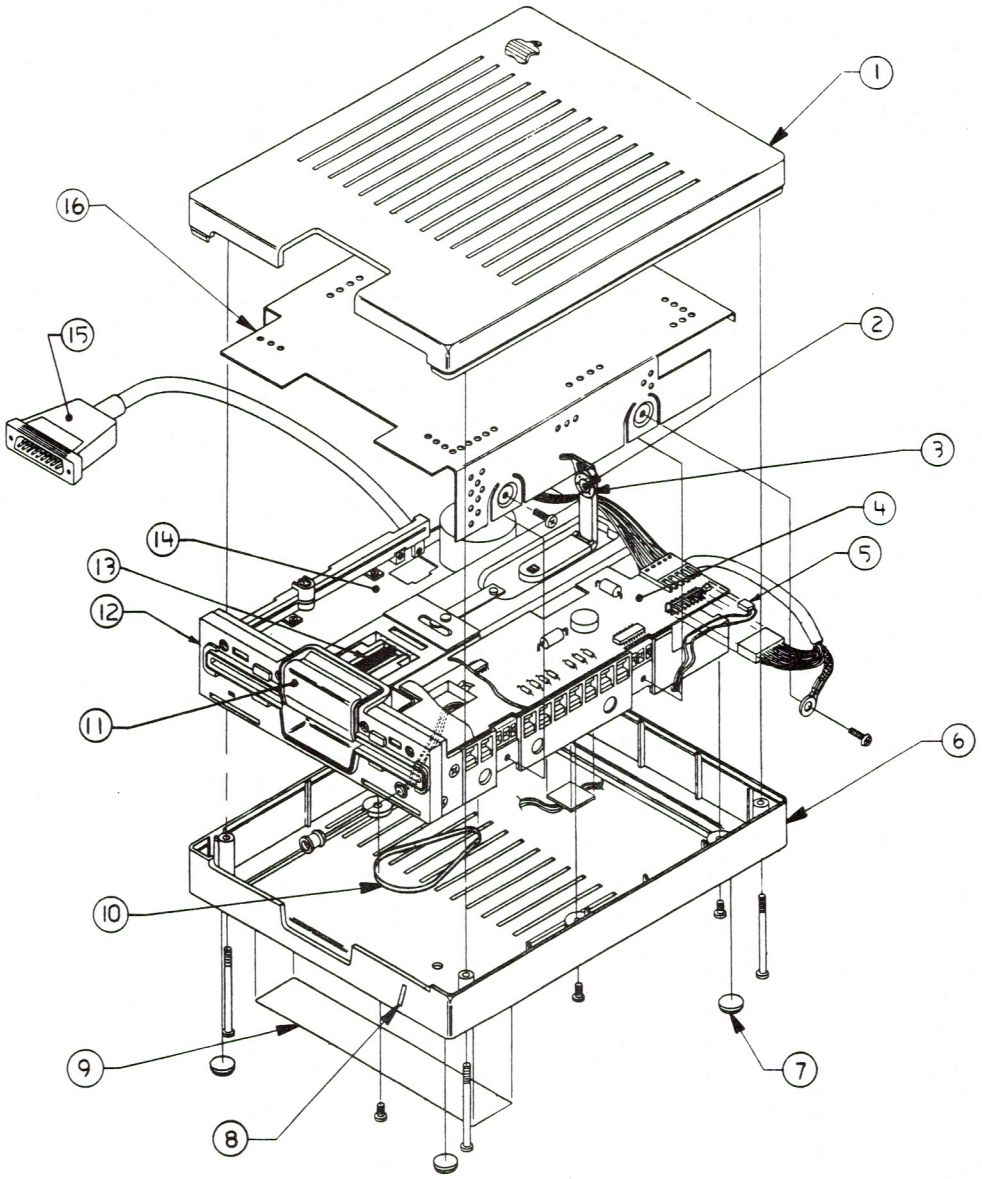
Disk IIc

Section 4 – Illustrated Parts List

❑ CONTENTS

4.3 Finished Goods Assembly (Figure 1)

The figure and list in this section include all piece parts that can be purchased separately from Apple for the Disk IIc, along with their part numbers. These are the only parts available from Apple. Refer to your *Apple Service Programs Manual* for prices.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

❑ DISK IIc – FINISHED GOODS ASSEMBLY (Figure 1)

Item	Part No.	Description
1	655-5006	Top Case Assembly, External Drive IIc
2	U815-0064	Load Button
3	805-5038	Upper Head Shield Plate
4	661-0265	Apple IIc Analog Board
5	590-0221	Disk IIc LED Cable
6	655-5007	Bottom Case Assembly, External Drive IIc
7	865-0021	Bumper Foot
8	815-0836	Disk IIc LED Lens
9	655-5005	Label, External Disk Drive IIc
10	U880-0002	Disk Drive Belt
11	815-0811	Disk Drive Door (Latch), Beige
	815-0587	Disk Drive Door (Latch), Platinum
12	815-0810	Disk Drive Bezel
13	870-0023	Spring
14	661-0264	Apple IIc Drive Mechanism
15	590-0212	Disk IIc Cable
16	805-0756	Disk IIc Top Shield

UniDisk 3.5

UNIDISK 3.5 TECHNICAL PROCEDURES

TABLE OF CONTENTS

Section 0 - Service Notes

Diskette Ejection Problems.....0.3
Removing Diskettes Which Will Not Eject.....0.5

Section 1 - Basics

Introduction.....1.1
Drive Mechanism Packaging.....1.1

Section 2 - Diagnostics

Introduction.....2.2
Formatting and Copying.....2.2
Booting From the UniDisk 3.5.....2.4
Saving and Deleting.....2.5

Section 3 - Troubleshooting

Things to Remember.....3.2
UniDisk 3.5 Symptom Chart.....3.3

CONTINUED ON NEXT PAGE

©Apple Computer, Inc., 1985, 1986.
No part of this document may be reproduced in any form without the written permission of Apple Computer, Inc.

UniDisk is a trademark of Apple Computer, Inc. ProDOS, Apple, and the Apple logo are registered trademarks of Apple Computer, Inc.

Section 4 - Take-Apart

Tools Needed.....4.3
Bottom Cover.....4.3
Top Cover.....4.5
Controller Board.....4.7
Drive Mechanism.....4.11

Section 5 - Illustrated Parts List

UniDisk 3.5 Illustrated Parts List and Diagrams.....5.1

UniDisk 3.5 Technical Procedures

Section 0

Service Notes

Contents:

Diskette Ejection Problems.....0.3
 Removing Diskettes Which Will Not Eject.....0.5

DISKETTE EJECTION PROBLEMS

Whenever a diskette from a UniDisk 3.5 does not fully eject, the user must push the diskette back in and attempt to eject it electronically. This can be done by pressing the Eject button on the front of the UniDisk. The user should attempt this two or three times. As a last resort, the user can insert a large paper clip in the pin hole located to the right of the slot where the diskette is inserted.

IMPORTANT: Once the diskette becomes "frozen" and does not fully eject, the user must NOT force the diskette by pulling it out from the drive. Doing so can cause possible damage to the disk drive mechanism. If the user has tried to forcibly remove the diskette from the disk drive, refer to "Removing Diskettes Which Will Not Eject" below.

In addition to the precautions discussed above, the user should be aware of other factors which can affect the insertion and ejection of a diskette.

- A diskette should be inserted by pressing the diskette gently into the drive. Avoid grasping and pushing the diskette, as this may cause the diskette to go in only part way and stop. If this happens the user should attempt to eject the diskette as described above.

- Diskettes which contain three or more labels may not slide easily into and out of the diskette slot in the UniDisk case. Should a third label be required, either the other labels should be removed first or the diskette should be discarded.

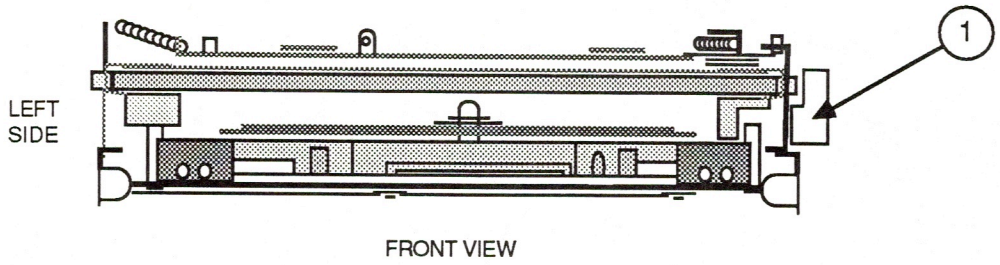


FIGURE 1

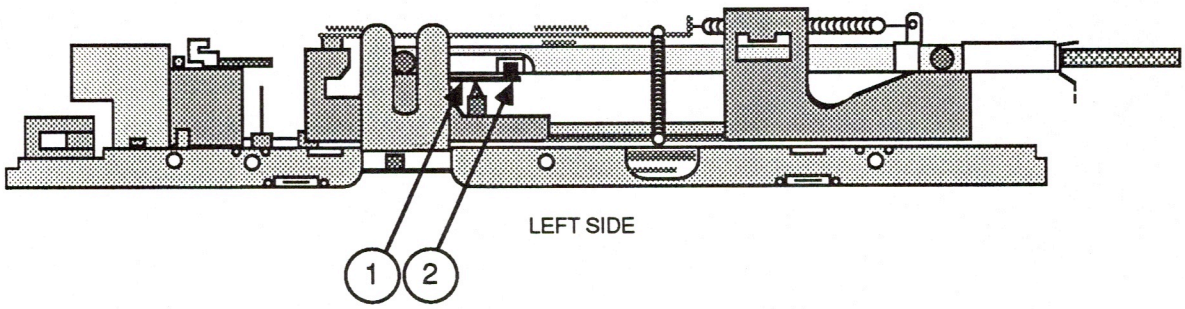


FIGURE 2

Removing Diskettes Which Will Not Eject

If a diskette becomes "jammed" in a customer's disk drive, the following procedure should be used to remove it prior to returning the disk drive.

1. Remove the disk drive mechanism. (See **Section 4, Take-Apart.**)

2. Place the disk drive mechanism on a flat surface, with the Printed Circuit Board facing down and the diskette opening facing you (see Figure 1).

3. If the diskette is not already fully inserted into the disk drive, push it in until it is properly seated.

4. Press the eject lever at the right side of the disk drive (see Figure 1, #1).

5. Turn the disk drive so that the left side is facing you.

6. Locate the small arm with a cylindrical cog at its end. This arm is located near the left-to-right center of the drive mechanism (see Figure 2, #1). This cog will be caught in the half-moon depression of the diskette case.

7. Insert a small screwdriver at the position shown in Figure 2, #2 and **gently** move the arm away from the diskette until the diskette pops forward slightly. Remove the diskette from the disk drive.

8. Return the defective disk drive to Apple and follow the instructions in **Section 4, Take-Apart,** to replace the disk drive with a new unit.

UniDisk 3.5 Technical Procedures

Section 1

Basics

INTRODUCTION

The UniDisk™ 3.5 disk drive is a double-sided drive providing 800 kilobytes of storage per diskette for the Apple® IIe and IIc personal computers. Using the ProDOS® Operating System, UniDisk 3.5 can easily transfer formatted data files between the 5 1/4" diskettes and the 3.5" higher capacity diskettes.

NOTE: Refer to **Drive Compatibility** under the **Disk Drives** tab to find out which of the Apple 3.5-inch 800K drive mechanisms may be used in the UniDisk 3.5.

DRIVE MECHANISM PACKAGING

When sending the drive mechanism in for exchange, it **MUST** be shipped in the Apple-approved packaging, which includes the shipping fixture (800K shield for the internal drive) and the protective packaging disk. Refer to **Section 5, Illustrated Parts List,** for drawings and part numbers of these items.

UniDisk 3.5 Technical Procedures

Section 2

Diagnostics

Contents:

Introduction.....2.2
Formatting and Copying.....2.2
Booting From the UniDisk 3.5.....2.4
Saving and Deleting.....2.5

INTRODUCTION

The ProDOS User's Diskette will be used for testing the various functions of the UniDisk 3.5. This section is divided into three procedures. The first procedure will have you format a diskette in the UniDisk 3.5 and copy two files from the 5 1/4" ProDOS User's Diskette onto the formatted diskette in the UniDisk 3.5. The second procedure will have you boot directly from the UniDisk 3.5 using the boot diskette you just created. The third procedure will have you save and delete a file from the same diskette. If the UniDisk 3.5 displays any problems with these procedures, turn to **Section 3, Troubleshooting.**

If you are using the Apple IIc, the Monitor ROM upgrade must be installed for compatibiliy with the UniDisk 3.5 (refer to **Apple IIc Technical Procedures** for Monitor ROM upgrade procedures).

The Apple IIe must have the UniDisk 3.5 interface card installed.

NOTE: Refer to the ProDOS Users Manual if you are unfamiliar with ProDOS. If you prefer you may use AppleWorks after you have formatted the 3.5" diskette under ProDOS. Using AppleWorks, you can select the ProDOS prefix of the formatted 3.5" diskette and use the UniDisk 3.5 for the storage device.

FORMATTING AND COPYING

1. On the Apple IIe, install a 5 1/4" disk drive into slot 6.

 On the Apple IIc, use the internal 5 1/4" disk drive.

2. On the Apple IIe, install the UniDisk 3.5 interface card into slot 5 and connect the UniDisk 3.5.

 On the Apple IIc, connect the UniDisk 3.5 to the external drive port. It will be recognized as slot 5, drive 1.

3. Insert the ProDOS User's Diskette into the 5 1/4" disk drive. Power on the system.

 The main menu will appear.

4. Type **F** for ProDOS **Filer.**

 The **Filer** main menu will appear.

5. Type **V** for **Volume Commands.**

 The **Volume Commands** Menu will appear.

6. Type **F** for **Format a Volume.**

 A screen will appear asking which volume you wish to format.

7. On both the Apple IIe and the Apple IIc, type **5** and press **<RETURN>.**

 You have specified slot 5, drive 1.

8. Type in **TEST** as the volume name and press **<RETURN>.**

 A warning will appear on the screen notifying you that you are about to format a large volume.

9. Press **<RETURN>.**

 The UniDisk 3.5 will whirr. When the red light goes off, the formatting is complete.

10. Press **<ESC>.**

 The **Filer** menu will appear.

11. Type **F** for **File Commands.**

 The **File Command** menu will appear.

12. Type **C** for **Copy Files.**

 The **Copy Files** screen will appear. You will need to transfer two files from the ProDOS User's Diskette to the UniDisk 3.5 diskette.

13. For the first **PATHNAME:** enter **/USERS.DISK/PRODOS** and press **<RETURN>.**

14. For the second **TO PATHNAME:** enter **/TEST/PRODOS** and press **<RETURN>.**

15. Press **<RETURN>**.

 The drives will whirr and the file **ProDOS** will be copied from the ProDOS User's Diskette to the UniDisk 3.5 diskette named Test. The message **Copy Completed** will be displayed.

16. For the first **PATHNAME:** enter **/USERS.DISK/BASIC.SYSTEM** and press **<RETURN>**.

17. For the second **TO PATHNAME:** enter **/TEST/BASIC.SYSTEM** and press **<RETURN>**.

18. Press **<RETURN>**.

 The drives will whirr and the file **Basic.System** will be copied from the ProDOS User's Diskette to the UniDisk 3.5 diskette named Test. The message **Copy Completed** will be displayed.

19. Power off the system.

BOOTING FROM THE UNIDISK 3.5

Apple IIe

1. Remove the 5 1/4" disk drive interface from slot 6. Power on the system.

 The screen will display **Apple II,]** and the cursor.

2. Enter **PR#5** and press **<RETURN>**.

 The UniDisk 3.5 will come on. The screen will display **PRODOS BASIC 1.1,]** and the cursor.

Apple IIc

1. Remove the ProDOS User's Diskette from the internal drive. Power on the system.

 The UniDisk 3.5 will come on. The screen will display **PRODOS BASIC 1.1,]** and the cursor.

The UniDisk 3.5 has now been booted. Continue to the next procedure.

SAVING AND DELETING

1. Enter the following program, pressing **<RETURN>** after each line of text entered.

```
NEW
10 PRINT "SAVING AND DELETING TO THE UNIDISK 3.5."
20 PRINT "THIS IS A TEST."
30 END
```

2. Type in **SAVE TEST1** and press **<RETURN>**.

 The UniDisk 3.5 will come on and whirr. Wait until the drive light goes out before continuing.

3. Type in **CATALOG** and press **<RETURN>**.

 The screen should show the following:

```
 NAME           TYPE  BLOCKS  MODIFIED         CREATED          ENDFILE SUBTYPE

*PRODOS          SYS      30  18-SEP-84  0:00  <NO DATE>          14848
*BASIC.SYSTEM    SYS      21  18-JUN-84  0:00  <NO DATE>          10240
 TEST1           BAS       1  <NO DATE>        <NO DATE>             20

BLOCKS FREE: 1541     BLOCKS USED:   59     TOTAL BLOCKS: 1600
```

4. Type in **DELETE TEST1** and press **<RETURN>**.

 The UniDisk 3.5 will come on and whirr. Wait until the drive light goes out before continuing.

5. Type in **CATALOG** and press **<RETURN>**.

 The screen should show the following:

```
 NAME           TYPE  BLOCKS  MODIFIED         CREATED          ENDFILE SUBTYPE

*PRODOS          SYS      30  18-SEP-84  0:00  <NO DATE>          14848
*BASIC.SYSTEM    SYS      21  18-JUN-84  0:00  <NO DATE>          10240

BLOCKS FREE: 1542     BLOCKS USED:   58     TOTAL BLOCKS: 1600
```

6. Repeat the saving and deleting twice to ensure there is no problem with the UniDisk 3.5.

IF THE UNIDISK 3.5 IS ABLE TO ACCOMPLISH THE ABOVE PROCEDURES WITHOUT PROBLEMS, THE UNIDISK 3.5 IS FUNCTIONING PROPERLy.

UniDisk 3.5 Technical Procedures

Section 3

Troubleshooting

Contents:

Things to Remember.....3.2
UniDisk 3.5 Symptom Chart.....3.3

THINGS TO REMEMBER

1. When exchanging a drive mechanism, you must package it as specified in **Section 1, Basics.**

2. The UniDisk 3.5 will only work with ProDOS based applications and files.

3. The Apple IIc **MUST** have the Monitor ROM upgrade to work correctly with the UniDisk 3.5. Refer to the **Apple IIc Technical Procedures** for Monitor ROM upgrade procedures.

4. The Apple IIc recognizes the UniDisk 3.5 as being in slot 5, drive 1.

5. The Apple IIe must use the UniDisk 3.5 Apple IIe Interface Card to connect to the UniDisk 3.5. The location of the interface card determines the slot assignment.

UNIDISK 3.5 SYMPTOM CHART

The UniDisk 3.5 has three replaceable exchange modules (the drive mechanism, the controller board, and the interface card for the Apple IIe) and three replacement parts (the external drive cable, the micro-switch eject cable assembly, and the LED cable assembly).

Two general rules for troubleshooting the UniDisk 3.5 are:

1. Use known-good software. (It can save you a lot of time!)

2. Be sure you are addressing the correct slot (refer to #4 and #5 in **Things to Remember**).

If the UniDisk 3.5 demonstrates a symptom listed below, replace the module or part listed under the corrective action(s) in the order listed. If a corrective action does not fix the problem, the original board should be reinstalled before you perform the next step.

SYMPTOM	CORRECTIVE ACTION
Drive will not come on. LED flashes once or does not light.	1. Swap interface card (IIe) 2. Swap controller card 3. Swap drive mechanism 4. Swap external drive cable 5. Swap LED assembly
Drive will read but not write.	1. Swap drive mechanism 2. Swap controller card 3. Swap interface card (IIe) 4. Swap external drive cable
Drive will not read, but LED comes on.	1. Check software 2. Swap drive mechanism 3. Swap controller card 4. Swap interface card (IIe)
Drive will not eject diskette.	1. Refer to "Diskette Ejection Problems" in **Section 0, Service Notes** 2. Swap drive mechanism 3. Swap micro-eject switch assembly

UNIDISK 3.5 SYMPTOM CHART (Continued)

Drive functions, but LED is not lit.	1. Swap LED assembly 2. Swap drive mechanism 3. Swap controller card

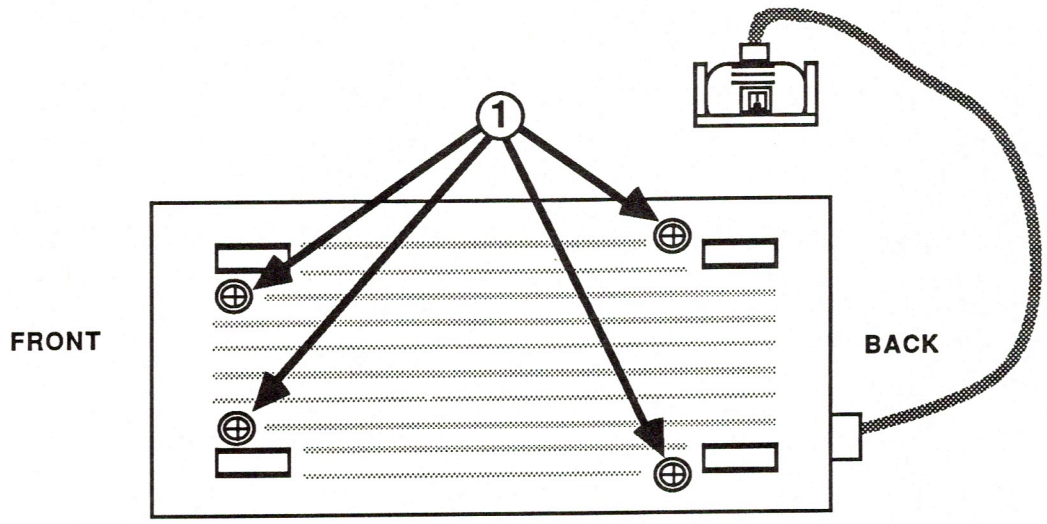
UniDisk 3.5 Technical Procedures

Section 4

Take-Apart

Contents:

Tools Needed.....4.3
Bottom Cover.....4.3
Top Cover.....4.5
Controller Card.....4.7
Drive Mechanism.....4.11



BOTTOM VIEW

FIGURE 1

TOOLS NEEDED

The following will be needed for the take-apart procedures:

#2 Phillips screwdriver, magnetized
Small Phillips screwdriver
Small flathead screwdriver
Small needlenose pliers

REMOVE AND REPLACE BOTTOM COVER

Remove

1. Set the UniDisk 3.5 upside down.
2. Remove the four screws (see Figure 1, #1).
3. Hold the external cable in place and lift the bottom panel off.

Replace

1. Position the bottom cover, hold the external cable and slide the bottom cover into place.
2. Replace the four screws (see Figure 1, #1).

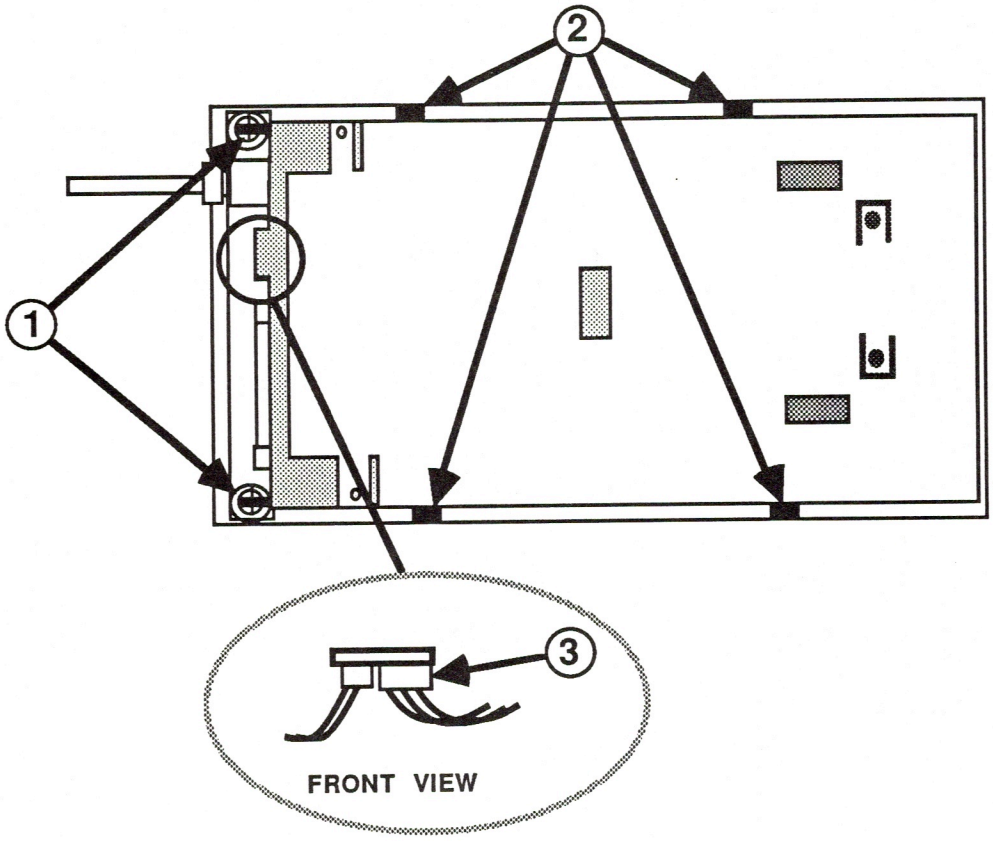


FIGURE 2

REMOVE AND REPLACE TOP COVER

Remove

1. Remove the bottom cover.

2. There are washers with black wire guides connected to them which are held in place by the screws. Bend the black wire guides on top of each screw out of the way (see Figure 2, #1) and remove the two screws (see Figure 2, #1).

3. Remove the four small black rubber guides from the sides of the case with needlenose pliers (see Figure 2, #2).

5. DO NOT PULL ON THE WIRES. Disconnect the eject button connector (see Figure 2, #3) by gently prying off the connector with a small flathead screwdriver.

6. Lift the entire metal case from the top cover.

Replace

1. Position the metal case onto the top cover. There is a hole in the upper RFI shield which fits over a plastic tab located towards the front of the top cover. Be sure the LED and eject button wires can be seen on each side of the case.

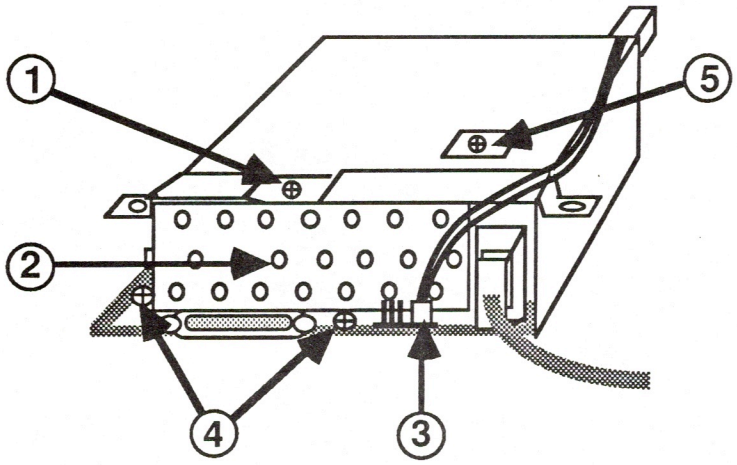
2. Replace the two screws and the washers with the black guides to hold the wires in position (see Figure 2, #2).

3. Replace the four black rubber guides to hold the wires in position (see Figure 2, #2).

4. Connect the eject button connector (see Figure 2, #3).

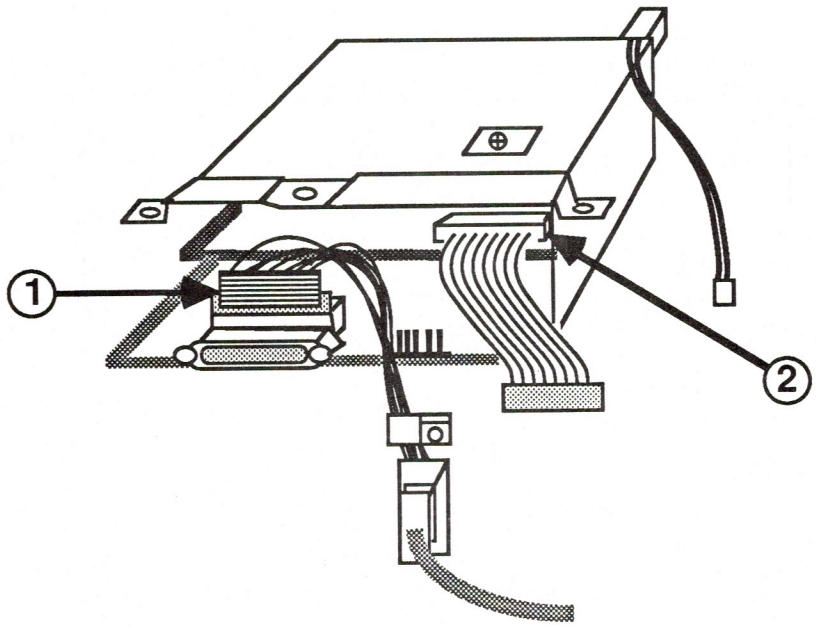
5. Bend the black guides over the wires and the screws.

6. Replace the bottom cover.



BACK VIEW

FIGURE 3



BACK VIEW

FIGURE 4

REMOVE AND REPLACE CONTROLLER CARD

Remove

1. Remove the bottom cover and the top cover.

2. Remove the one screw (see Figure 3, #1) that holds the small metal shield in position (see Figure 3, #2). Remove the shield.

3. DO NOT PULL ON THE WIRES. Disconnect the LED connector (see Figure 3, #3) by gently prying off the connector with a small flathead screwdriver.

4. Remove the two screws that hold the controller card in place (see Figure 3, #4).

5. Note the positioning and remove the one screw that holds the interface cable grounding clip in position (see Figure 3, #5).

6. Slide the controller card halfway out and disconnect the interface connector from the controller board (see Figure 4, #1).

7. Remove the cable connector plug from the analog board (see Figure 4, #2). This will free the cable which is soldered to the controller card.

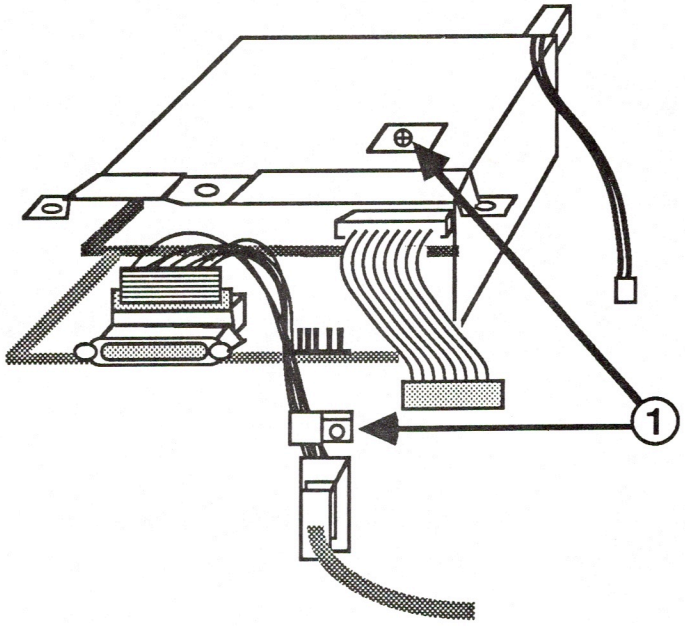
8. Slide out the controller board.

Replace

1. Slide the controller board halfway in. The board should be on top of the guides in the RFI shield.

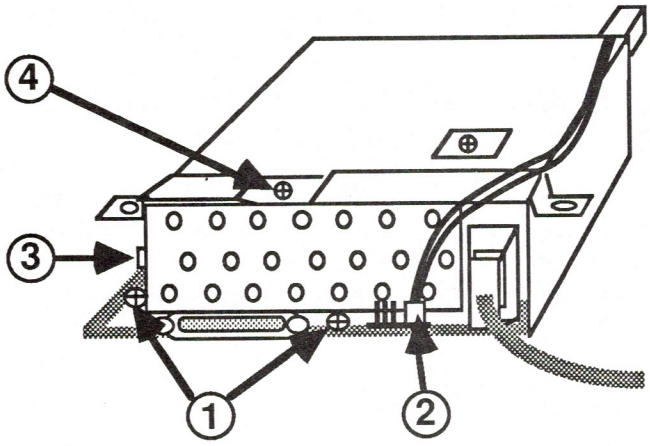
2. Connect the cable connector to the analog board mounted on the mechanical assembly (see Figure 4, #2).

3. Connect the interface cable to the controller board (see Figure 4, #1).



BACK VIEW

FIGURE 5



BACK VIEW

FIGURE 6

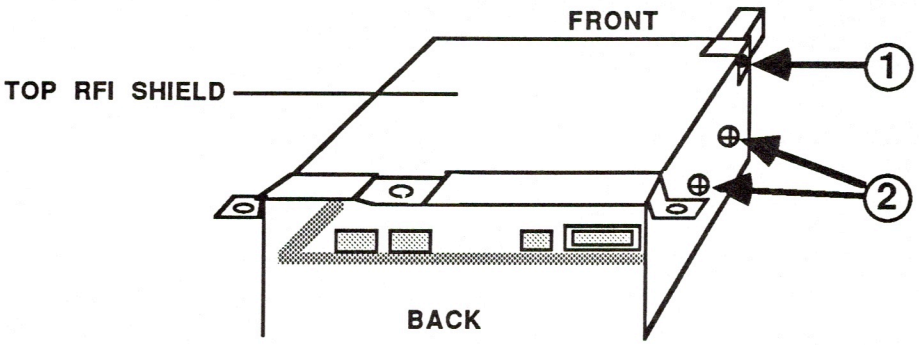
4. Slide the controller board into the assembly. Place the interface cable grounding clip on the exposed metal casing on the interface cable. Using a small pair of needlenose pliers, position the clamp onto the screw mount and replace the screw (see Figure 5, #1)

5. Replace the two screws that hold the controller card in place (see Figure 6, #1).

6. Connect the LED connector (see Figure 6, #2).

7. Insert the tab on the left of the small shield (see Figure 6, #3) into the slot on the left of the RFI shield and replace the screw holding it (see Figure 6, #4).

8. Replace the top and the bottom covers.



DRIVE MECHANISM

FIGURE 7

REMOVE AND REPLACE DRIVE MECHANISM

Remove

1. Remove both the bottom and top covers.

2. Remove controller card.

3. Using the small Phillips screwriver remove the screw that holds the LED in position (see Figure 7, #1).

4. Remove the four screws that hold the disk drive mechanism in the RFI shield. There are two screws on each side of the shield. Figure 7, #2, shows one side.

5. Slide the drive out towards the front of the shield.

Replace

1. Position the RFI shield top up and slide the drive assembly, connectors first, into the shield. The drive mechanism fits snugly between the screw mounts on the RFI shield.

2. Start the four screws that hold the disk drive mechanism to the RFI shield. After all four screws are started, tighten each one. There are two screws on each side of the shield. Figure 7, #2, shows one side.

3. Position the LED so it is facing the front and the screw hole lines up with the RFI shield screw hole. Replace the screw using the small Phillips screwdriver (see Figure 7, #1).

4. Replace the controller card.

5. Replace the top and the bottom covers.

UniDisk 3.5 Technical Procedures

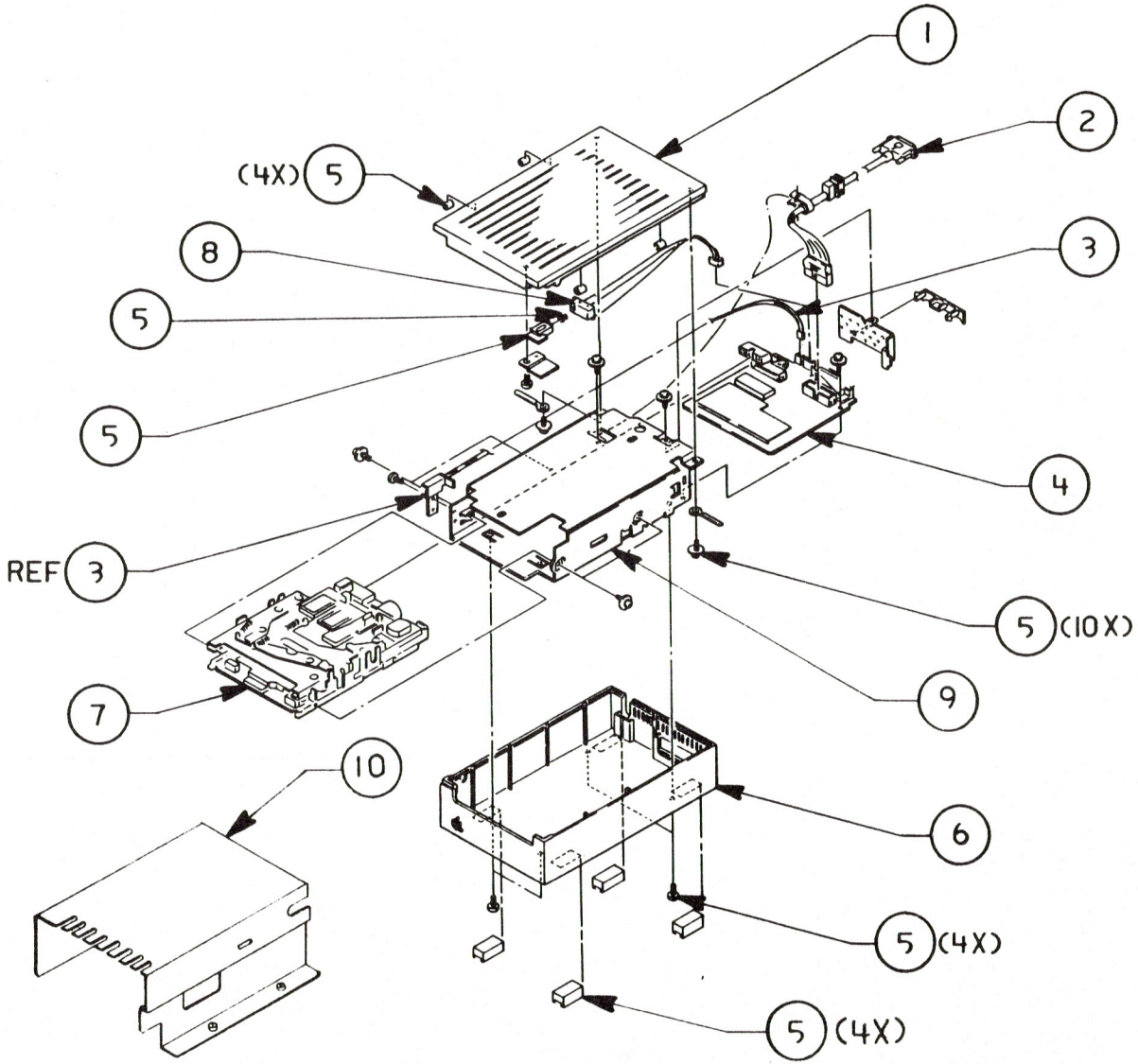
Section 5

Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the UniDisk 3.5, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

Contents:

Illustrated Parts List..... 5.2


1
2
(4X) 5
8
3
5
5
4
REF 3
5 (10X)
9
7
10
6
5 (4X)
5 (4X)

UNIDISK

Item	Part No.	Description
1	815-0904	Case Top, UniDisk 3.5
2	590-0321	External Drive Cable
3	590-0100	Assembly, LED Cable
4	661-0307	UniDisk 3.5 Controller Card
5	076-0192	Parts Set, UniDisk 3.5
6	815-0905	Case Bottom, UniDisk 3.5
7	661-0345	800K Mechanism, Apple 3.5 Drive
8	590-0101	Cable Assembly, Microswitch Eject
9		RFI Shield - not available
10	805-0217	Shipping fixture (Shield for Internal Drive) - used for transporting the 800K drive mechanism

Apple 5.25 Drive/UniDisk

Apple Technical Procedures

Apple 5.25 Drive / UniDisk

Table of Contents

Section 1 – Basics	1.2	Product Description
	1.2	Model Comparison
	1.2	Connecting the Drives
Section 2 – Take-Apart	2.2	Introduction
	2.3	Case Top and Shield
	2.6	Cable
	2.8	Analog Board
	2.10	Mechanical Assembly
	2.13	Door, Spring, and Bezel
Section 3 – Adjustments	3.2	DSPEED
Section 4 – Troubleshooting	4.2	Using the Troubleshooting Flowchart
	4.3	Troubleshooting Flowchart
Section 5 – Preventive Maintenance	5.2	Introduction
	5.2	Read/Write Head
	5.3	Head Load Button
	5.4	Motor Drive Belt
Section 6 – Illustrated Parts List	6.3	Finished Goods Assembly (Figure 1)

©Apple Computer, Inc., 1986, 1987. No portion of this document may be reproduced in any form without the written permission of Apple Computer, Inc.

Apple IIGS and UniDisk are trademarks of Apple Computer, Inc. DuoDisk, Apple, and the Apple logo are registered trademarks of Apple Computer, Inc.

Apple Technical Procedures

Apple 5.25 Drive / UniDisk

Section 1 – Basics

❑ CONTENTS

1.2 Product Description
1.2 Model Comparison
1.2 Connecting the Drives

❑ PRODUCT DESCRIPTION

Model Comparison

The Apple® 5.25 Drive and the UniDisk™ are floppy-disk drives that use removable single-sided disks to store and retrieve up to 143K of data per disk. The Apple 5.25 Drive and the UniDisk are compatible with any computer in the Apple II family.

The Apple 5.25 drive, in the new platinum case color, contains the same drive mechanism as the UniDisk, but has the added feature of a security lock connector. All technical procedures for the Apple 5.25 Drive and the UniDisk are the same.

Connecting the Drives

The 5.25 Drive and the UniDisk may be connected to a disk drive port (on an Apple IIGS™ or IIc) or to a 5.25 Drive controller card installed in a peripheral slot (in an Apple IIe or IIGS). (The 5.25 Drive controller card is identical to the UniDisk or DuoDisk® controller card.)

1. The controller card supports a maximum of two 5.25 drives. To add more drives, you must install a second 5.25 Drive controller card. You cannot plug a 3.5 drive into a 5.25 controller card, nor a 5.25 drive into a 3.5 controller card.

2. The disk drive port on the Apple IIGS will support a combination of up to four daisy chained 5.25 and 3.5 drives.

For installation instructions and daisy chain configurations, refer to the *Apple 5.25 Drive Owner's Guide.*

Apple Technical Procedures

Apple 5.25 Drive / UniDisk

Section 2 – Take-Apart

❑ CONTENTS

2.2 Introduction
2.3 Case Top and Shield
2.6 Cable
2.8 Analog Board
2.10 Mechanical Assembly
2.13 Door, Spring, and Bezel

Note: If a step is underlined, detailed instructions for that step can be found elsewhere in this section.

❑ INTRODUCTION

Interchangeable Parts

The mechanical assemblies for the Apple 5.25 Drive, UniDisk, and DuoDisk are all the same and are therefore interchangeable—except for their sub-bezels and doors. **If you exchange mechanical assemblies, be sure to make the following sub-bezel and door replacements.**

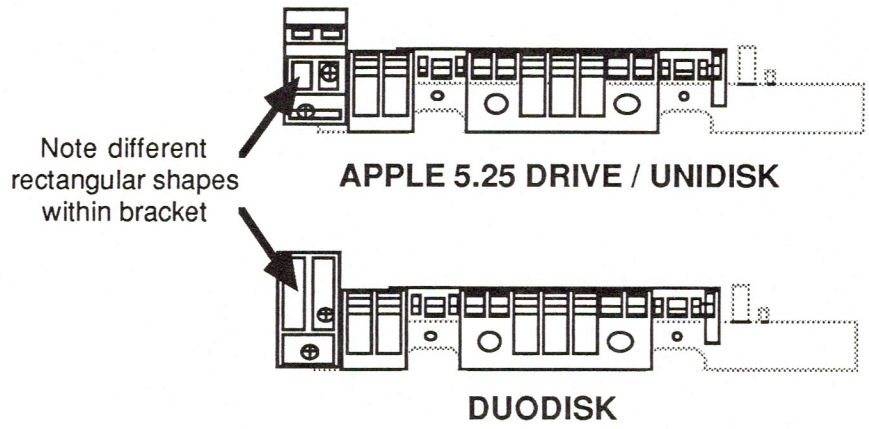
Apple 5.25 Drive/ and UniDisk

If you exchange the mechanical assemblies of an Apple 5.25 Drive and a UniDisk, **you must be sure to replace the sub-bezel and door so that the colors are appropriate.** The UniDisk has a beige door and sub-bezel. The Apple 5.25 Drive has a platinum door and sub-bezel.

DuoDisk

If you exchange a DuoDisk mechanical assembly with an Apple 5.25 Drive or a UniDisk, you must exchange the sub-bezels. The figure below shows the different sub-bezels.

The procedures for replacement are given in "Door, Spring, and Bezel" later in this Take-Apart section.



❑ CASE TOP AND SHIELD

Materials Required

Medium Phillips screwdriver

Remove

To remove the case top and shield:

1. If the Apple 5.25 Drive or UniDisk is connected to a computer, power off the computer and disconnect the drive. (You will not be able to remove the cable until you remove the cover.)

2. Turn the drive upside down and remove the four Phillips screws (Figure 1, #1).

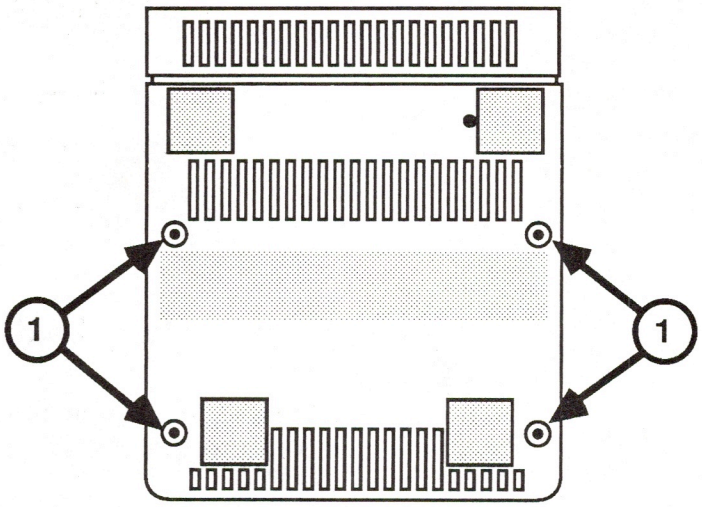


FIGURE 1

4. Orient the drive so that the back is facing you and remove the two Phillips screws (Figure 2, #1).

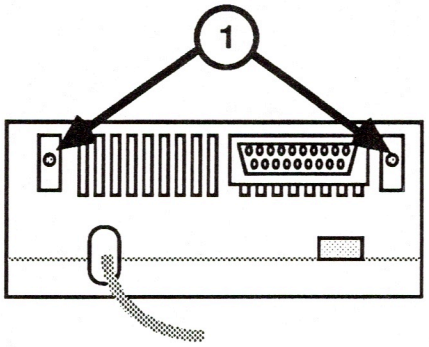


FIGURE 2

5. Pull up on the back of the case top until it clears the cable as shown in Figure 3. Slide the case top back and away from the drive.

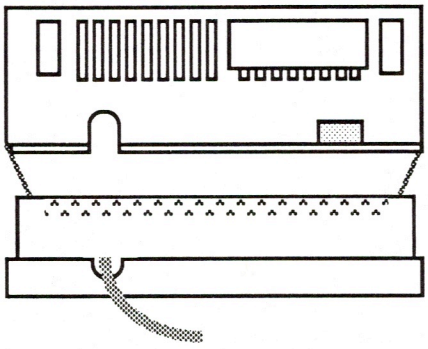


FIGURE 3

6. Remove the screw that secures the shield (top metal plate) to the chassis.

7. Pull up on the back edge of the shield and lift it off.

Replace

To replace the shield and case top:

1. Replace the shield by fitting the front prongs into place, then lowering the back until the shield is flush with the chassis.

2. Replace the Phillips screw to secure the shield to the chassis.

3. Fit the cable brace into the cutout at the back of the case bottom.

4. Slide the front edge of the case top against the front bezel as shown in Figure 4.

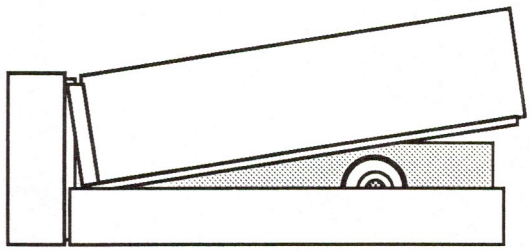


FIGURE 4

5. Push forward on the case top as you lower it over the cable, until the case top is flush against the case bottom.

6. Turn the drive upside down and replace the four Phillips screws.

7. Position the drive so that the back is facing you and replace the two Phillips screws.

❑ CABLE

Materials Required

Medium Phillips screwdriver

Remove

To remove the cable:

1. Remove the case top and shield.

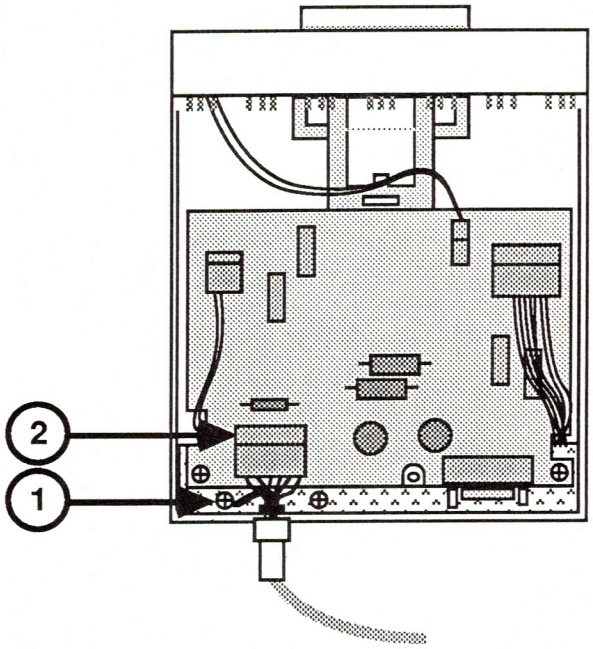


FIGURE 5

2. Remove the Phillips screw (Figure 5, #1) that secures the cable ground terminal and the case ground strap to the chassis.

3. Disconnect the bus connector from header J2 on the analog board (Figure 5, #2), and pull it back through the hole in the metal backplate.

4. Remove the cable.

Replace

To replace the cable:

1. Fit the cable brace (Figure 6, #1) into the slot at the back of the case bottom.

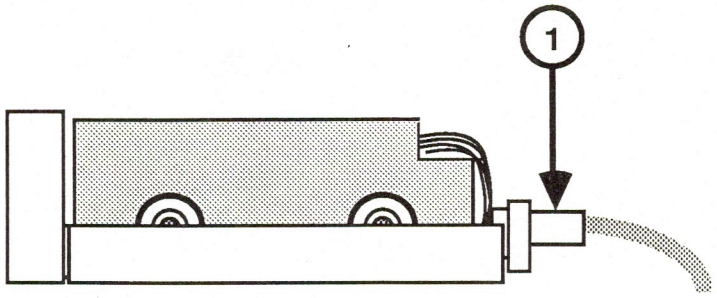


FIGURE 6

2. Replace the Phillips screw to secure the cable ground terminal and the ground strap to the chassis (Figure 5, #1).

3. Push the bus connector back through the hole in the metal backplate and reconnect it to header J2 on the analog board (Figure 5, #2).

4. Replace the shield and case top.

❑ ANALOG BOARD

Remove

To remove the analog board:

1. Remove the case top and shield.

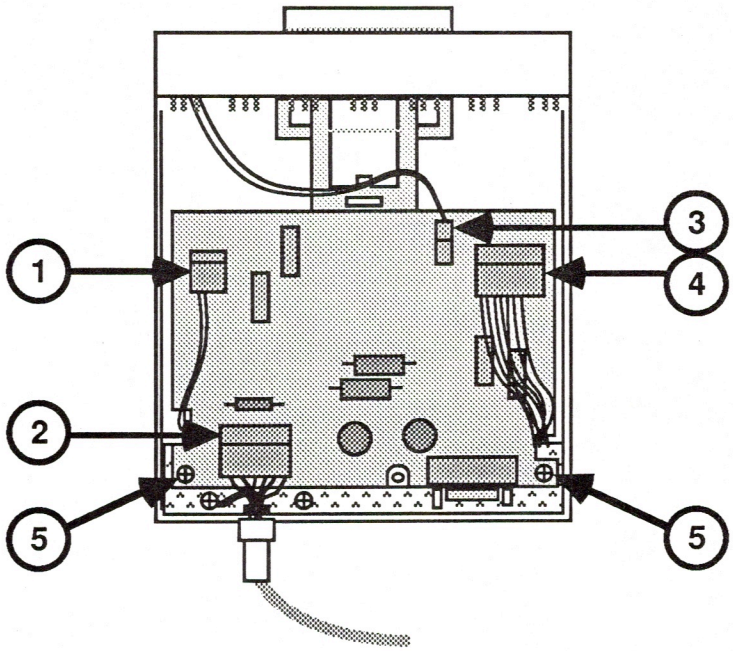


FIGURE 7

2. Disconnect the following connectors, pulling on the connector housing (not the wires):

 - Head connector J4 (Figure 7, #1)
 - Bus connector J2 (Figure 7, #2)

 Note: Pull the bus connector back through the metal backplate on the analog board.

 - LED connector J5 (Figure 7, #3)
 - Stepper motor connector J1 (Figure 7, #4) - note position of wires in Figure 7.

3. Remove the two Phillips screws (Figure 7, #5) that secure the analog board to the chassis.

4. Carefully lift the analog board off of the chassis.

Replace

To replace the analog board:

1. Lift the connector wires away from the mechanical assembly.

2. Slide the front end (opposite the DB-19 connector) of the analog board between the supports at front of the chassis walls.

***CAUTION:** Be careful not to pinch the connector wires while positioning the analog board.*

3. Route the connector wires through the cutouts at the sides of the analog board.

4. Connect the following connectors:

 - Head connector J4 (Figure 7, #1) - fits only one way

 - Bus connector J2 (Figure 7, #2)

 Note: First route the bus connector through the metal backplate on the analog board.

 - LED connector J5 (Figure 7, #3)

 - Stepper motor connector J1 (Figure 7, #4) - note position of wires in Figure 7

5. Replace the two Phillips screws (Figure 7, #5) to secure the analog board to the chassis.

6. Replace the shield and case top.

❑ MECHANICAL ASSEMBLY

Remove

To remove the mechanical assembly:

1. Remove the case top and shield, the cable, and the analog board..

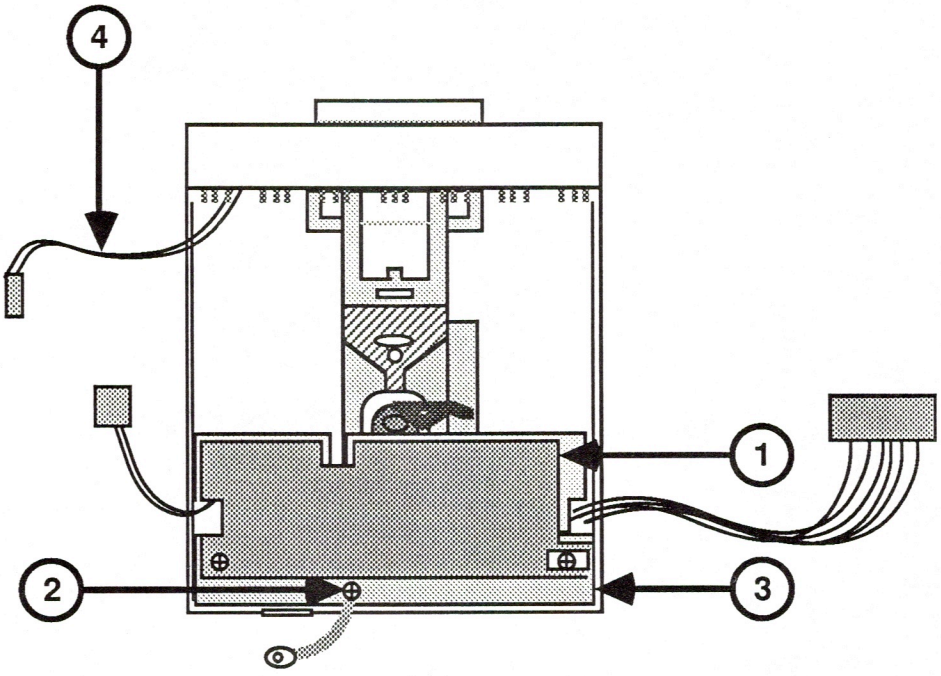


FIGURE 8

2. Remove the black insulation paper (Figure 8, #1).
3. Remove the Phillips screw (Figure 8, #2) that secures the ground strap to the chassis. Set the ground strap aside.
4. Lift off the metal shield (Figure 8, #3) and set aside.
5. Grasp the LED wires (Figure 8, #4) as close to the front bezel as possible and pull the LED lamp out of the front bezel.
6. Lift up on the back of the metal chassis and slide it completely out of the case bottom.

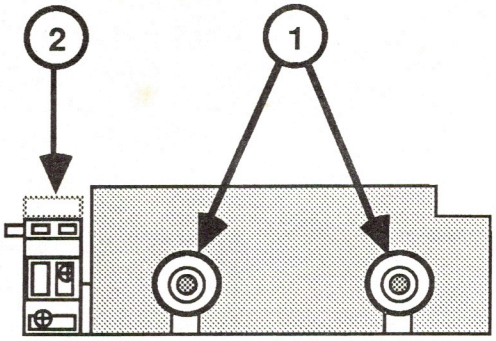


FIGURE 9

7. Orient the drive sideways, as shown in Figure 9, and remove the two Phillips screws (Figure 9, #1). Then turn the drive so that you face the other side, and remove those two screws.

8. Lift up on the sub-bezel (Figure 9, #2) and carefully slide the mechanical assembly out of its bottom shield.

Replace

To replace the mechanical assembly:

Note: Be sure to read the introduction to this section prior to exchanging the mechanical assembly.

1. Place the mechanical assembly back inside its bottom shield.

2. Replace the Phillips screws (Figure 9, #1) on both sides of the drive to secure the mechanical assembly inside the bottom shield.

3. Replace the metal shield (Figure 8, #3), routing the cables through the cutouts at the sides of the shield. (See Figure 8.)

4. Place the black insulation paper (Figure 8, #1) on the metal shield as shown in Figure 8.

5. Replace the Phillips screw (Figure 8, #2) to secure one end of the ground strap to the chassis.

6. Locate the case bottom and insert the LED into the cutout provided at the front.

7. Close the door of the mechanical assembly.

8. Hold the LED cable out of the way while you carefully slide the mechanical assembly into the case bottom.

9. Replace the analog board, cable, shield, and case top.

❑ DOOR, SPRING, AND BEZEL

Materials Required

Medium Phillips screwdriver

Remove

1. Remove the mechanical assembly.
2. Remove the two Phillips screws at each side of the sub-bezel, and remove the sub-bezel.
3. Slide the door off the mechanical assembly.

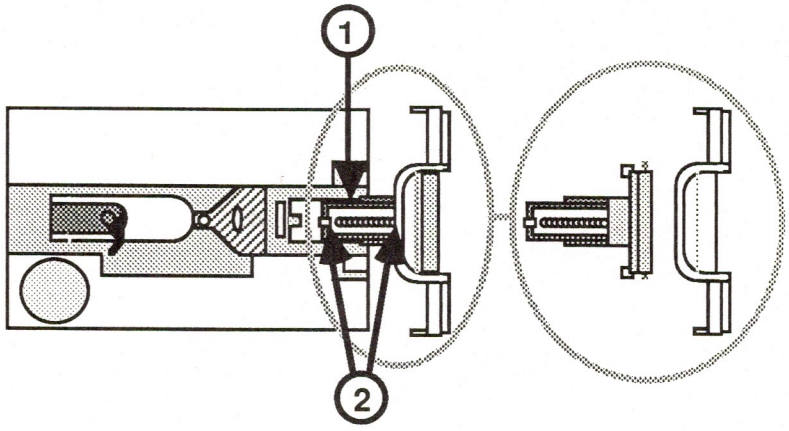


FIGURE 10

Replace

1. Install the new door, making sure the side edges of the door fit into the grooves on the metal carriage (Figure 10, #1) and the door springs fit over the supporting tabs (Figure 10, #2).
2. Reattach the sub-bezel.

 Note: A defective mechanical assembly must be returned to Apple with a sub-bezel attached.

3. Replace the mechanical assembly.

Apple Technical Procedures

Apple 5.25 Drive / UniDisk

Section 3 – Adjustments

❑ CONTENTS

3.2 DSPEED

Note: If a step is underlined, detailed instructions for that step can be found in Section 1, Take-Apart.

❑ DSPEED

This adjustment procedure was written to be used with the *Apple 5.25-Inch Disk Drive Diagnostic*—if the test indicates that you need to adjust the drive speed. All information on setting up and running the diagnostic are in the *Disk Drives Technical Procedures*, Section 1, 5.25-Inch Disk Drive Diagnostic.

Materials Required

Apple 5.25-Inch Disk Drive Diagnostic diskette
Disk Drives Technical Procedures manual
A small (jeweler's) flatblade screwdriver
Apple II, II Plus, IIe, IIc, or IIGS
Known-good disk drive and controller (the controller is not necessary for the IIc and IIGS
Apple 5.25 Drive or UniDisk to be adjusted

Making the Adjustment

To adjust the DSPEED (drive speed):

1. Remove the disk drive case.

2. You should have the DSPEED diagnostic running; if you do not, see the *Disk Drive Technical Procedures*, Section 1, 5.25-Inch Disk Drive Diagnostic.

3. Locate the DSPEED adjustment hole under the drive being adjusted. It is a small hole next to the rubber foot on your right (when facing the drive) and nearest the front of the drive. The adjustment screw is located inside the hole.

 Note: When you make the DSPEED adjustment, keep the Apple 5.25 Drive or UniDisk flat.

4. The adjustment is extremely sensitive, so turn the adjustment screw very slowly. The indicator on the screen will move back and forth, showing changes of the speed.

5. Adjust the speed so that the indicator stays within the "good" range, as close to 0 as possible. Let the test run for 30 seconds.

6. Press <Escape> to return to the main menu; then repeat the test.

 Does the DSPEED now stay within the "good" range?

 - Yes—Press <Escape> to return to the main menu.

 - No—If the DSPEED cannot be properly adjusted, return the faulty drive mechanism to Apple.

7. Remove the *Apple 5.25-Inch Disk Drive Diagnostic* diskette from the drive.

Apple Technical Procedures

Apple 5.25 Drive / UniDisk

Section 4 – Troubleshooting

❑ CONTENTS

4.2 Using the Troubleshooting Flowchart
4.3 Troubleshooting Flowchart

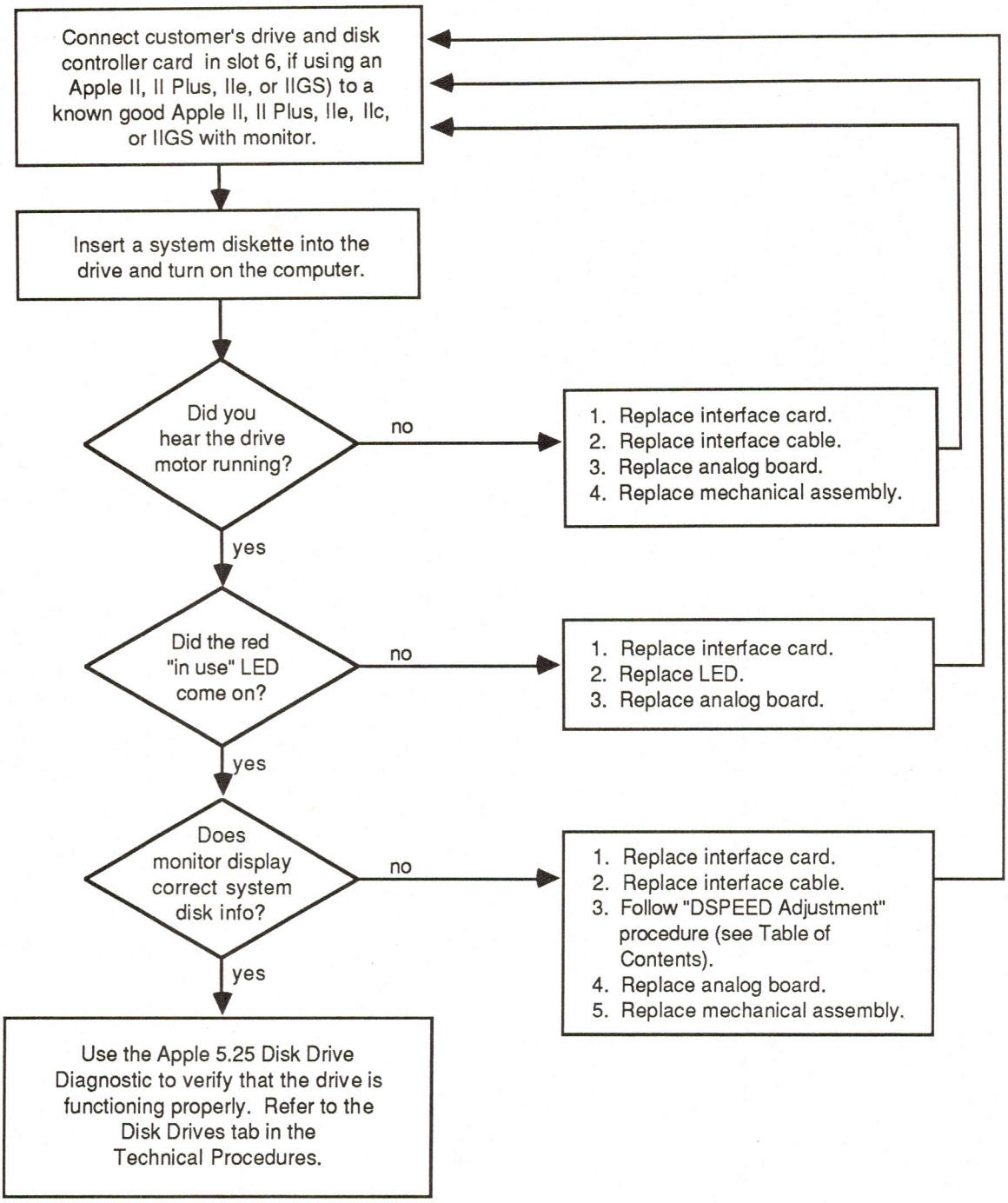
❑ USING THE TROUBLESHOOTING FLOWCHART

Whenever a customer brings in a presumably bad Apple 5.25 Drive or UniDisk, use the flowchart on the following page as a troubleshooting guide. Begin with the box in the upper left corner of the page. When you get to one of the answer boxes, swap the modules, one at a time, in the order in which they are listed. Each time you swap out a module, go back to the beginning of the flowchart. Turn on the computer and see if you can boot a system diskette (preferably a ProDOS *System Utilities* diskette.)

Once you are able to boot the *System Utilities*, be sure to run the latest Apple drive diagnostic, performing any adjustments necessary. Reinstall the customer's modules, one at a time, running the drive diagnostic after each exchange to isolate the bad modules.

Note: If you do not know how to connect the Apple 5.25 Drive or UniDisk to an Apple computer, refer to the *Apple 5.25 Drive Owner's Guide* for instructions.

UNIDISK / APPLE 5.25 DRIVE TROUBLESHOOTING FLOWCHART



Apple Technical Procedures

Apple 5.25 Drive / UniDisk

Section 5 – Preventive Maintenance

❑ CONTENTS

5.2 Introduction
5.2 Read/Write Head
5.3 Head Load Button
5.4 Motor Drive Belt

Note: If a step is underlined, detailed instructions for that step can be found in Section 2, Take-Apart.

❑ INTRODUCTION

The read/write head should be cleaned any time the computer or disk drive is being serviced. The head load button should be replaced whenever it is worn or dirty. The motor drive belt should be inspected any time the disk drive is being serviced.

❑ READ/WRITE HEAD

Materials Required

#2 Phillips screwdriver
Cotton swabs
Isopropyl Alcohol (80% alcohol/20% water)

Procedure

To service the read/write head:

1. Remove the top cover, drive shield, and analog board.
2. Clean the guide rails with the isopropyl alcohol. **Do not** use grease.
3. Inspect the head for worn or dull spots in the ceramic. If you find any, replace the mechanical assembly.
4. Clean the head with the isopropyl alcohol.
5. Move the read/write head assembly back and forth along the full length of its travel. Check for any blockage or friction. If there is any, replace the mechanical assembly.
6. Replace the analog board, drive shield, and top cover.

❑ HEAD LOAD BUTTON

Materials Required

#2 Phillips screwdriver
Needlenose pliers
Head load button

Procedure

To service the head load button:

1. Remove the top cover, drive shield, and analog board.

2. Lift up the head load arm. If the head load button is worn or dirty, squeeze the top part of the load button with small needlenose pliers and let the button drop down.

3. Insert the new load button into the head load arm. Press the button until it snaps into place.

5. Replace the analog board, drive shield, and top cover.

❑ MOTOR DRIVE BELT

Materials Required

#2 Phillips screwdriver
Motor drive belt

Procedure

To service the motor drive belt:

1. Remove the case, and the top and bottom shield.

2. Turn the drive upside down and locate the belt. Check the belt for cracks, slippage, and elasticity. If the belt is dry or cracked, or if it slips, continue with step 3.

3. Slip the belt off the pulley.

4. Place the new belt around the motor spindle and then slip it around the pulley.

5. Replace the top and bottom shield, and the case.

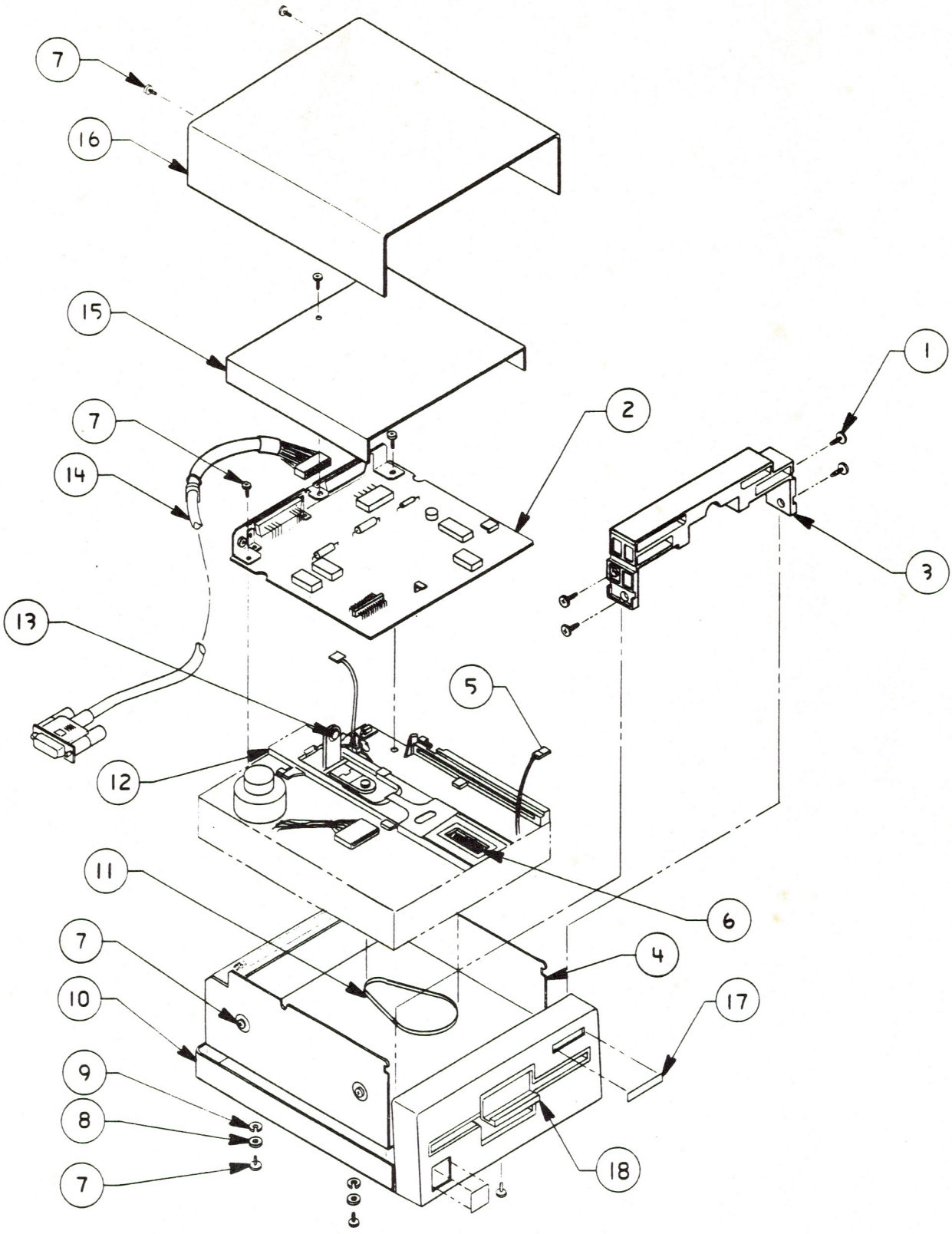
Apple 5.25 Drive / UniDisk

Section 6 – Illustrated Parts List

❑ CONTENTS

6.3 Finished Goods Assembly (Figure 1)

The figure and list in this section include all piece parts that can be purchased separately from Apple for the Apple 5.25 Drive and UniDisk, along with their part numbers. These are the only parts available from Apple. Refer to your *Apple Service Programs Manual* for prices.


7
16
15
7
14
13
12
11
7
10
9
8
7
2
1
3
5
6
4
17
18